

The Pennsylvania State University
The Graduate School

**UNDERSTANDING RIDE-SHARING IN ON-DEMAND
PLATFORMS: STAKES, DEPENDENCY, AND SHARING**

A Dissertation in
Information Sciences and Technology
by
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Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

December, 2020

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Abstract

The sharing economy has reshaped the way of supporting exchanges between workers and consumers in various industries. As these platforms support a large amount of temporary, gig work for millions of workers, there has been mixed sentiment on the work experience, and a muddled understanding of what makes it a gig versus sharing. Focusing on ride-sharing, this dissertation aims to inform the future of ride-sharing work through understanding how platform support work in different ride-sharing contexts while situating ride-sharing work under the broader sharing economy. To further enunciate these issues, I took a qualitative approach to understand the role of ride-sharing platforms through drivers' experience and comparing these experiences in ride-hailing with carpool. Specifically, I present three studies in this dissertation, the findings of workers' experience and the broader implications of these studies.

Despite numerous efforts to understand the impacts of these platforms and their algorithms on drivers, how to better serve and support drivers with these platforms remains an open challenge. In study 1, I framed ride-hailing work through the lens of Stakeholder Theory to highlight drivers' position in the workplace, which helps inform the design of a more ethical and effective platform. To this end, I analyzed drivers' forum discussions about their lived experiences of working with the ride-hailing platform. From this study, I identify and discuss the impact of the stakes that drivers have in relation to both the Uber corporation and their passengers, and look at how these stakes impact both the platform and drivers' practices.

Studies have been showing mixed driver experiences on the platform while many of the drivers are working part-time. In this study, I tried to understand why drivers work part-time, how this impacts their view of the platform, and what this means for more accurately evaluating the design of these platforms. To investigate this question, I focused on situating ride-hailing in the lives and constellation of gigs that drivers maintain. I collected 53 survey responses and conducted 10 semi-structured interviews with drivers to probe these questions. I found that the

extent that drivers categorize themselves as part-time is less about the number of hours worked and more about how dependent they are on ride-sharing income. The level of this dependency seemed to heavily influence how they interacted with the platform and their attitudes towards difficulties faced. It seemed to me that in some ways that the design or functioning of the platform almost pushed users towards working part-time. I discuss the importance of taking these different types of workers and their situations into consideration when evaluating the design and usability of these platforms.

As the continued growth in the sharing economy, it has become unclear when an activity is sharing a resource vs. providing a service. To unpack this difference, I studied two successful carpooling groups (university students traveling home and commuting among professionals), which we contrast with previous literature on ride-hailing apps (e.g., Uber). The two communities that I studied differ in that: professionals, had more routine ride-sharing needs based on their commute; and students, arranged rides to return home for school breaks or long weekends. In this study, I detail how common needs and backgrounds impacted how carpoolers treated each other. Leveraging these findings, I outline design paths for both the sharing and gig economies to better realize the ideas of the sharing economy.

Overall, this dissertation aims to inform the understanding of ride-sharing work under the context of sharing economy. In presenting workers' experiences under different platform context, I look to 1) provide concrete recommendations for worker-centered design efforts in future platforms; 2) inform strategies in designing for a fair and equitable workplace through workers' relationship with customers.

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Acknowledgments

I am deeply indebted to many people for their strong support during my graduate studies. At this time, I take the opportunity to acknowledge those who have made an impact on my doctoral journey and accomplishment.

I would like to express my most sincere gratitude to my advisor Dr. Benjamin V. Hanrahan for his unending support during this entire process. I thought no one would advise me as a Ph.D. student until he told me in the elevator that I will be his first student. I could not have completed this dissertation without his guidance, feedback and vision at various phases of my work. I look to carry his training in discipline, dedication and the craft of doing research onto my future career and influence others who I will be working with.

I would also like to thank my committee for providing valuable feedback that grounded this research in diverse perspectives. Particularly, I would like to thank Dr. John M. Carroll for pointing my research towards community sharing which led my investigation in carpooling; I would also like to thank Dr. Michael Maffie's input which further grounded my research in labor perspective; I would also like to thank Dr. Daniel Susser for providing valuable discussion in structuring and framing my studies.

Lastly, I would like to dedicate this dissertation to my husband Bilal. Thank you for being a constant source of support and encouragement during the challenges of my graduate school, in life and letting me be me. I am truly thankful for having you in this journey.

Introduction

The sharing economy has reshaped the way of supporting exchanges between workers and consumers in various industries [Botsman and Rogers, 2011], ride-hailing being one of the leading force, both in the number of its participants and the amount of transactions [Rosenblat, 2018]. Among others, the Human-Computer Interaction (HCI) community has been exploring the technology mediated human experiences in this field for many years [Kittur et al., 2013, Glöss et al., 2016, Bellotti et al., 2015, Lee et al., 2015]. From a consumer point of view, the sharing economy is considered the realization of collaborative consumption in a constructed model [Botsman and Rogers, 2011]. As an alternative way of sharing, swapping and trading goods and services, collaborative consumption focuses on access over ownership [Belk, 2014], sustainability [Botsman, 2013], and redistribution of underutilized assets [Cusumano, 2015]. At the same time, on-demand/peer-to-peer platforms are often cross referenced as some form of sharing economy [Uhlmann, 2016, Eckhardt and Bardhi, 2015] as they support large amount of temporary, gig work for a labor market that is continue to grow. As these on-demand platforms are inherently socially embedded, with millions of users and high volumes of transactions, the platforms are re-shaping the form of work and consumption for both workers and consumers. This dissertation takes ride-hailing as the prime example of sharing economy, looking to understand the context in which technology mediated human activities on these platforms. From this understanding, I present a similar sharing activity in community carpool, and contrast the practice of carpooling with ride-hailing. At the end of the dissertation, I conclude with lessons learned from both contexts of exchanges, as well as the applicability of these lessons in other sharing platforms.

The sharing economy has garnered attention not only from HCI, scholars in public policy [Rosenblat, 2018], regulation [Collier et al., 2017] and labor relations [DeVault et al., 2019] have also contributed invaluable perspectives. This dissertation take insights from an interdisciplinary perspective, focusing on HCI

and labor’s discussion on the technology mediated work through algorithmic management. This perspective is largely inspired by Lee’s work in recognizing how algorithm supported platforms conducting managerial decisions in facilitating exchanges between workers and consumers [Lee et al., 2015]. In addition, I also follow the perspectives of previous work where scholars treat various peer-to-peer platforms as workplaces [Martin et al., 2014, Kneese et al., 2014b]. Particularly, I aim to unpack how such algorithm supported decision making results in bias and power asymmetries between workers and consumers [Hanrahan et al., 2017, Rosenblat and Stark, 2016] while engaging in work assignment, evaluation and promoting transactions.

As many have investigated the work experience and practice of various gig platforms, particularly in ride-hailing [Raval and Dourish, 2016, Alkhatib et al., 2017], there has not been much research providing a theoretical framing of ride-hailing work. Seeing how bias happened on ride-hailing platform towards and from drivers [Hanrahan et al., 2017], as well as other various challenges facing drivers from a driver forum¹, I borrowed stakeholder theory – a business ethics theory to frame the practice and algorithmic decision of ride-hailing work [Ma et al., 2018]. In discussing the various ways platform management breaches workers’ stakes, this work examined the ride-hailing from a critical lens, which contrasted with the early optimism of the proponents of sharing economy [Botsman and Rogers, 2011, Gansky, 2010]. This contrast become one underlying theme that motivated several later investigations.

One of the investigation motivated by the contrast of positive and negative aspect of ride-hailing work is to unpack drivers’ varied experiences. That is, while there’s a contrasting view of sharing economy among scholars [Slee, 2017, Botsman, 2013], I observed a similar contrasting sentiment among drivers who live the experience of working on the ride-hailing platform. Why are workers sharing different, sometimes contrasting experiences of their work? What are the factors that contributed towards their views and work practices? In Chapter 4, I present an interview study which further discuss these questions.

Although highly referenced [Wallsten, 2015, Uhlmann, 2016], the sharing economy was rarely defined with clear boundaries. Many peer-to-peer, two-sided markets are vaguely associated with the notion of sharing, whether or not it is actually based on the communal ideal purported by some early scholars [Gansky, 2010]. In the case of ride-hailing, the more I learned about Uber and Lyft, the more I realize that working as a driver is quite different from the idea of altruism or a sense of community [Botsman and Rogers, 2011]. Perhaps platforms like Uber were never meant to be associated with *sharing*, once considered a “sharing economy based company” [Wallsten, 2015, Uhlmann, 2016] that is getting recognized as a misnomer [Eckhardt and Bardhi, 2015]. In an effort to unpack what ride-*sharing* actually look like, I studied two groups of carpoolers who form and arrange rides

¹<https://uberpeople.net/>

among themselves, around a common need of getting to similar destinations and shared social and geographical background. In Chapter 5, I present the observation and interviews with these groups and provide discussion on how the ideals of sharing can be re-imagined for future platform designs.

1.1 Motivation

Over the years, people have become critical of the work conditions supported by gig economy, recognizing a growing workforce and decreasing average earnings for gig workers [Buchwald, 2019, Eskow, 2015]. These sentiment echoed with concerns from academia for a deteriorating labor market accompanied with the growth of sharing economy [Edelman and Luca, 2014, Davis, 2016, Weil, 2014]. To some, the success of Airbnb and Uber is a direct result of dismissing regulation and disrupting the existing way of business [Eskow, 2015, Collier et al., 2017]. Similar efforts in disrupting the regulation preceded the sharing economy – one example being the transition of trucking industry from its union days to the more recent contracting schemes [Viscelli, 2016]. A result of such transition in deregulating the industry, whether it's trucking or ride-hailing, is the deteriorated employment relationship for workers [Weil, 2014]. Under this background, the sharing economy quickly became a success with the support of development in technology.

In the case of ride-hailing, part of this transition is realized in replacing human decisions with algorithms, where the platform acts as a human manager in various managerial decisions [Ma et al., 2018]. This shift of responsibility has streamlined the dispatching process, optimized transaction and minimized the cost of head count for managing and evaluating workers [Kneese et al., 2014a], as they have been outsourced to consumers and algorithms [Hanrahan et al., 2017]. Within this, workers' stake seem to be absent in the grand picture of platform design, particularly the lack of consideration for how work is mediated. An example of this lack of consideration in platform design for drivers' experience is the arbitrary decisions of how work was mediated. This is reflected by workers' lack of choice when platform dictates when and where they work, meanwhile, having to deal with the risks on the road (e.g. long distance pick up, drunk rider etc.) themselves [Rosenblat, 2018]. While platform companies are starting to design some solutions to off-set the increasing grievance of workers, for instance allowing drivers set destinations twice a day (the platform will then dispatch a ride that's on their way) in some markets, most of these solutions are superficial. From a system point of view, corporations have not and perhaps will not fundamentally question the design of their platforms (e.g. setting price, how matching is accomplished etc.), which has benefited from algorithm decision making in its formalization of the transaction process. That is, through the platform design, drivers' means of connecting to a rider, accepting a ride, picking up, dropping off, getting paid

and rated is highly dictated by a process that's prescribed by the platform. In human machine intelligence studies, Suchman pointed out that a consequence of formalization of communication between human and machine is the lack of situated actions and reconfiguration of human agencies along the process [Suchman, 2007]. Button developed this argument into studies of work, contending that work actions are contingent upon the context of the production [Button and Sharrock, 2009]. In ride-hailing, these consequences are realized in the various challenges drivers face (e.g. ratings caused deactivation). Having this in mind, I want to find out how the platform mediation is impacting the experience of workers through the workers' reaction toward the platform management. Beyond those reactions, what are some pragmatic or inventive strategies drivers employ to exercise control in reactions to the algorithm? From these findings, how to interpret the drivers' reactions to the platform mediation on rides-hailing platforms through the lens of existing moral frameworks?

As research have called for more fair workplace designs for various on-demand platforms [Rayle et al., 2014, Martin et al., 2017, Thebault-Spieker et al., 2015], in the case of ride-hailing, evidently being a driver is often challenging and frustrating [Kneese et al., 2014a, Ma et al., 2018, Rosenblat and Stark, 2016], some drivers do enjoy the flexibility the gig provides [Hall and Krueger, 2018, Rosenblat, 2018]. In my own experience of working with drivers, for every driver who complained about working on the platform, another driver expressed that Uber/Lyft has worked out great for them. I realize that the mixed reality drivers facing cannot be fully enunciated without considering drivers' background and employment arrangements. This is indicative of the tension between the growing evidence and discussion around the challenges of working on ride-hailing platforms [Rosenblat and Stark, 2016, Kneese et al., 2014a, Lee et al., 2015] and the sufficiently large – and perhaps growing – number of drivers willing to work on these platforms. Given that most of drivers work part-time on these platforms [Hall and Krueger, 2018, Berg and Johnston, 2018], why do they have varied attitudes toward working on these platforms? What are the factors in drivers' work and life situation that impact their ride-sharing experience while driving part-time?

While the on-demand platforms and work have experienced continued growth, researchers pointed out that the sharing economy [Slee, 2017] have been transitioning from the initial optimism highlighting the promise of the exchanges [Botsman, 2013] to the later more wary of the implications of unfettered gig labor [Rosenblat, 2018]. For instance, it seems that the promise of sharing – or as Botsman coined the term 'Collaborative Consumption' [Botsman, 2013] – is often motivated by people's good intentions and sense of community [Bellotti et al., 2015, Botsman and Rogers, 2011], whereas peer-to-peer markets such as Uber and Airbnb have been almost strictly profit driven [Guttentag, 2015, Rosenblat, 2018]. Particularly in ride-sharing context, as it continue to form the culture of ride-hailing, is there still a thing as "sharing" a ride? It makes sense to find out why do people share a

ride for free or only engage in sharing for instrumental benefits (e.g. sharing gas expense, using a high occupancy (HOV) lane etc.). To further unpack the promise and perils of on-demand exchanges, and to further understand what motivates different sharing activities, I looked into carpool activities in local communities – which both embodies the promise of sharing and supports the form of a ride-hailing service like Uber.

In this dissertation, I focus on understanding the practice and dependency of ride-hailing drivers while situating the discussion of these investigations in a broader on-demand platforms context. Through comparing the practice of ride-hailing and carpooling, I provide further discussion on the ideals of sharing and how that fits into the future of platform work.

1.2 Domains Involved in On-demand Work

I investigate how on-demand platform manifest in workers’ experience and its relationship with sharing economy under several domains of literature. In this section, I briefly introduce these concepts and particularly how they fit around this dissertation. A more in-depth version of these domains in literature is presented in the Chapter-2.

1.2.1 On-demand work and ride-hailing platforms

On-demand platforms have garnered much attention from Human-Computer Interaction (HCI) community in recent years, a large portion of the recent literature has focused on the experience and practices of workers on the platform [Kuhn, 2016, Kittur et al., 2013]. As a fast expanding economy model, some consider on-demand platforms were originated from crowdsourcing platforms, coined as “artificial artificial intelligence” [Irani, 2015] in the case of Amazon Mechanical Turker (AMT), which soon expanded to space-renting and ride-hailing platforms such as Airbnb [Guttentag, 2015], Uber [Lee et al., 2015] and many other new sectors. Some have studied on-demand platforms by the type of work it supports including micro-task platforms [Martin et al., 2014], ride-hailing platforms [Lee et al., 2015], space-renting [Edelman and Luca, 2014] and temporary help [Hannák et al., 2017]. Others focused on different aspect of working on the platform including power dynamic on the platform [Rosenblat and Stark, 2016], workers’ emotional labor on the platform [Raval and Dourish, 2016], platform management [Ma et al., 2018] etc. More investigations focused on platform work in different cultural and geographical contexts including platform work in India [Gupta et al., 2014, Ahmed et al., 2016], Bangladesh [Kumar et al., 2018], Namibia [Kasera et al., 2016] and Taiwan [Chen et al., 2019]. While studying the platform design and use of these platforms, one of the common way to frame these platforms is treating it as a workplace [Martin et al., 2014]. Among these different workplaces, ride-hailing

platforms is one of the most popular, in terms of socially embedded, number of engaging users and studied platforms [Thebault-Spieker et al., 2017]. While these research present a relatively comprehensive picture of working on an on-demand platform, particularly ride-hailing platform, much of the discussion are within the scope of interpreting platforms' capacity in mediating work, workers' practice and validating them at scale [Chen et al., 2015, Alkhatib et al., 2017]. While furthering an ethical understanding of ride-hailing platform's role in shaping work practices [Button and Sharrock, 2009], I conducted a qualitative analysis of a driver forum to explore ways in framing drivers' experiences on the ride-hailing platform.

1.2.2 Using stakeholder theory to examine managerial decisions in platform work

Stakeholder Theory is a managerial concept for analyzing multi-stakeholder constructs. Thus, it has been applied in research such as environmental management [De Lopez, 2001], health-care organizations [Werhane, 2000] and higher education [Heinfeldt and Wolf, 1998]. Stakeholder Theory was initially brought up in response to the then dominant stockholder-centric management model [Friedman, 1970, Jensen and Meckling, 1976], which is embodied by the claim that "the social responsibility of business is to increase its profits" [Friedman, 1970]. On the contrary, Stakeholder Theory emphasize that a core management responsibility is the general obligation to maintain an equitable and workable balance between the interests of stakeholders, which include stockholders, employees, customers, communities and general public at large [Abrams, 1951].

This theory become particularly relevant in the context of ride-hailing platforms as it literally implements the management of the workforce via the platform. And that the current design of on-demand platforms including ride-hailing platform is profit-driven, Stakeholder Theory thus provides an ethical lens to talk about who, in terms of which stakeholder groups, is being considered in various managerial decisions.

1.2.3 A historical background of part-time work

In recent decades, particularly in U.S. labor market, we have seen a trend of deteriorating labor relationship between workers and employers due to a shift within the structure of organizations [Davis, 2016]. These shifts mostly happened when businesses had given up on high cost of maintaining a hierarchical production structure, instead resorting in subcontracting, franchising and supply chain structures [Weil, 2014]. Among various industries, trucking business led the success in deregulating the industry, which resulted in the fall of trucker unions and the eventual rise of subcontracting work [Viscelli, 2016]. Another result of organizations shifting towards subcontracting, franchising and supply chain structure is the rise

of part-time work. This has created a unique situation of an increasing demand for temporary, informal work meeting an ever tolerating work force. This depressing labor market become a premise, at the same time, a beneficiary of technology supported work platforms, which in a way led to today's gig market [Davis, 2016].

1.2.4 Sharing in the on-demand economy

The early discussion of sharing activities started from community time banking [Collom, 2007, Collom, 2011], co-production [Bellotti et al., 2014, Carroll and Bellotti, 2015] and peer services [Van de Glind, 2013]. One of the focuses on these work is the motivation of community members to participate in collaborative activities as providers [Hamari et al., 2016]. Although financial gains are often found to be an important motivation [Eckhardt and Bardhi, 2015], researches have also found that people participate in community activities as providers mainly because of their personal needs and wants [Collom, 2007, Collom, 2011], socializing [Van de Glind, 2013] and altruism [Suhonen et al., 2010].

As a special case of ride-hailing services in sharing exchanges, carpooling meets the promise of collaborative consumption and the many assumptions of sharing economy [Botsman and Rogers, 2011, Chase and Chase, 2014]. This is due to the motivation of the providers of carpool is – compared to that of ride-hailing – less around direct monetary gains. Instead, carpoolers have an instrumental need in completing the exchange themselves (e.g. access HOV lane), therefore their participation, although may result in monetary transaction as a by-product of sharing cost, is not directly motivated by monetary gains. This is different from ride-hailing service such as Uber and Lyft, which is a transactional platform designed with a different set of success metric for the platform.

1.3 Research Questions and Approach

To understand the role of ride-hailing platforms in supporting work, I took a qualitative approach to understand platforms through drivers' practice, their lives around work and comparing ride-hailing with carpooling.

First, I conducted a forum analysis of one of the most popular ride-hailing driver forums, this analysis leveraged stakeholder theory as a moral lens in understanding platform designs that are affecting drivers' practices. I then conducted a survey and an interview primarily in understanding drivers' work schedule and how they fit ride-hailing among other full-time and part-time commitments. These studies aim to understand what "part-time" means for drivers and why there have been varied experiences. Lastly, I conduct an observation and interview to further unpack the notion of sharing in communities where student and professionals organize and arrange rides among themselves.

In framing my research questions, I use the term ‘ride-hailing’ to describe the platform supported service exchanges that are transactional, profit-driven such as Uber and Lyft, and ‘carpooling’ to describe the group exchanges that are formed among communities that are driven by people’s common needs and backgrounds. In addition, I use ‘ride-sharing’ as a term to describe the activities that are both for-profit services and sharing needs and backgrounds which embody ride-hailing and carpools in general.

1.3.1 Study 1: understanding worker experience on ride-hailing platforms

To understand workers’ experience and practice on ride-hailing platforms, and to interpret these experience from an ethical lens, I posed the below research questions:

- What are some pragmatic or inventive strategies drivers employ to exercise control in reaction to different actions taken by the algorithmic decisions?
- How to interpret the drivers’ reactions to algorithmic management on ride-hailing platforms through the lens of an existing moral framework?

This is a first step in understanding the practice of ride-sharing and how they are been affected and reacted by (and toward) the platform. Although related work has been focused on different aspect of working as a ride-hailing driver [Lee et al., 2015, Raval and Dourish, 2016], and some of these work have presented the role of platform in mediating drivers’ practices [Lee et al., 2015, Rosenblat and Stark, 2016], there haven’t been an appropriate ethical framework in analyzing these various realities presented previously. Through this study, I expect to provide an analysis of ride-hailing drivers’ work practice with such a ethical framework, and provide a basis of improving future platform designs.

1.3.2 Study 2: what are some external factors in drivers’ work and life situations that contribute to their varied experiences while driving "part-time"?

This study aims to answer the research question posed in this subtitle. In spite of drivers’ varied claims on their work experiences, recent literature have disproportionately paint a negative picture to this type of work [Ahmed et al., 2016, Rosenblat et al., 2016, Thebault-Spieker et al., 2017, Glöss et al., 2016, Alkhatib et al., 2017]. With the analysis from Uber that 80% of drivers work part-time [Hall and Krueger, 2018], I am wondering what does it actually mean to work part-time for drivers and why such divergence of experience exists.

Going into this study, I had initially sided with most of the recent research within the community and aligned myself to a more critical view of ride-hailing work [Rosenblat, 2018, Alkhatib et al., 2017]. Thus, my hypothesis at the time was that the overall experience of workers will present as varying degrees of challenges and difficulties as they work part-time. With this expectation in mind, I gathered and analyzed 53 survey responses, 10 ride-sharing drivers (8 drivers from the survey respondents, 2 drivers from social circles) for interviews. In later part of Chapter 4, I present the findings of this study while showing how my hypothesis looked presumptive in hindsight. Through these findings, I look to provide a more nuanced understanding of worker experience and how their work and life situations contribute to their varied experiences.

1.3.3 Study 3: Unpacking sharing through carpool groups

As stated earlier, the continued growth of research in sharing platforms has been accompanied by a muddying between the sharing and gig economy, and it has become unclear when an activity is sharing a resource vs. providing a service. This study aims to understand what does ‘sharing’ mean in transactional vs. community based exchanges in the case of ride-sharing? To unpack this difference, I studied two successful carpooling groups (university students traveling home and office commuting), which contrast with previous literature on ride-hailing apps (e.g. Uber). The two groups differ in that: professionals, had more routine ride-sharing needs based on their commute; and students, arranged rides to return home for school breaks or long weekends. This investigation details how common needs and background impacted how carpoolers treated each other. Leveraging these findings, I provide design paths for both the sharing and gig economies to better realize the ideas of the sharing economy.

With some early observations, I had several expectations before going into the study of the two carpool groups. Firstly, different from ride-hailing drivers, who provide their service to a rider from point A to point B, carpool drivers share their ride with riders while they themselves are trying to get from point A to point B. This shared goal inherently shifts the nature of the exchange from a *service* to a shared activity. In these sharing activities, the driver has a predetermined time and destination of traveling for their own traveling needs, they provide a ride to a stranger who happens to need a ride towards a similar destination. While some drivers mark the fare that’s comparative to market price, there are a fair number of drivers who are willing to provide rides to share gas cost, snacks, conversations with a rider.

Secondly, carpoolers mostly reside in the same city or neighborhood, that means they are familiar with a common set of local knowledge and references. Further, in cases for students from the same university even share the same identity as the university’s student, sport fans etc.

Lastly, I expect that these shared goals and backgrounds of carpoolers will affect how they interact during the ride, and how relationship form beyond the trips. For instance, students who carpoled may become acquainted afterwards, they may decide to carpool again at a later time.

1.4 Goals and Key Contribution

The overall goal of my research is to inform the future of ride-sharing work through understanding different ride-sharing contexts while situating ride-sharing work under the broader sharing economy.

1.4.1 Contribution to research

This research engaged in a stakeholder-centric view to gauge different design constructs of ride-hailing scenarios. This research also pointed to the importance in designing for workers' dependency in platforms beyond ride-hailing by taking a closer look on working part-time on the platform. Lastly, this research provide a contrast between when is it sharing and when is it a service. Specifically, the research was able to achieve these contribution through 1) informing the role of platform in managing the work and shaping the experience of workers in ride-sharing platforms from a lens of stakeholder theory; 2) highlighting the factors contributing to being a part-time worker and lastly 3) presenting two successful cases of carpool groups that actually resemble some ideals of sharing economy.

1.4.2 Contribution to practice

The contribution of this work to practice is mainly around design implications when different stakeholders are taken at the central of a design effort. The research presented new design opportunities for ride-sharing platforms in acknowledging people's common goals and backgrounds through comparing ride-hailing work with activities in two carpool groups. Future design efforts should take more awareness in terms of who is the platform designed for, which stakeholders are the beneficiaries and how that's justified in various design decisions.

Literature Review

The on-demand platforms are not invented out of thin air, it inherits many aspects of work structure from traditional labor industries. For instance, the relationship in on-demand work still resembles the traditional retail structure of manager, worker and client. This triangular power relationship [Lopez, 2010] dominates the experience of workers in both retail and on-demand work. With technology, corporations simply came up with a strategy to operationalize the managerial aspect of labor, which lead to an increase of transaction and exchanges. The strategies are not entirely novel either, instead, we've seen various efforts leading up to the moment of on-demand work since the deregulation of trucking industry [Viscelli, 2016], taxi industry [Hodges, 2020] and a rise of temporary broker agencies for various jobs [Scheiber, 2014].

Many studies see on-demand platforms as workplaces [Raval and Dourish, 2016, Kneese et al., 2014a, Martin et al., 2014]. When labor relations are managed and mediated by platforms [Lee et al., 2015], some components of the work become invisible [Martin et al., 2014], a result of this invisibility is the breakdowns in the divisions between what constitutes work, hobby, and volunteering [Rosenblat, 2018]. In addition, many platform companies assume that the exchanges between workers and consumers are mutually beneficial [Kneese et al., 2014a] and these exchanges are often thought as exclusively physical [Raval and Dourish, 2016]. However, research in labor [Hochschild, 2012], cultural studies [Illouz, 2007] and ride-hailing work [Raval and Dourish, 2016] have increasingly recognized the emotional demands in people's daily work and life activities that are mediated by algorithms. These work highlighted the nature of ownership and exploitation of workers' emotions by platforms.

An important topic in labor practice is the barrier of entry to an industry. Particularly in trucking, an industry that shares a similar labor context with taxi, is known for the high risk that worker has to take in entering [Viscelli, 2016]. While workers in various sectors take risks to enter a job market, truckers have a

higher barrier to enter compared to ride-hailing drivers and couriers. One of such barriers is reflected in the skills required to enter. In this case, trucking require more skill than ride-hailing or food delivery. At the same time, such barrier also serves a way for worker retention where trucking companies are known to keep the certain barrier intentionally in order to keep workers until they recruit new trainees [Viscelli, 2016]. On the other hand, ride-hailing, food delivery and other gig work often requires less (if not minimum) qualification which allow platform companies to reach an equilibrium for an abundant supply of new comers and a steadily growing demand. This comparison between ride-hailing and trucking indicates that the low barrier of entry, minimum skills requirement contribute to an abundance of supply for on-demand platforms. As a result, corporations are able to take advantage of this in negotiating with workers [Weil, 2014].

In following sections, I present detailed literature in three main area: 1) introducing stakeholder theory, its development over the years and how it fits within the framing of on-demand work; 2) part-time work and the discrepancy of research findings on work experiences in on-demand platforms; and 3) sharing activities under the framing of co-production and the promise and challenges in ride-hailing.

2.1 A Stakeholder View of Ride-hailing Work

Ride-hailing companies represent one of the major industries in the gig-economy [Edelman and Luca, 2014]. A common claim of the gig-economy – which Uber itself purports – is that workers may work ‘*whenever they want*’, ‘*wherever they want*’, and that they can ‘*be their own boss*’ [Rosenblat and Stark, 2016]. This claim, at least in the case of Uber, is not always supported by Uber and its platform [Rosenblat and Stark, 2016]. This is primarily due to the various barriers that drivers face to their agency in terms of information/power asymmetries [Rosenblat and Stark, 2016], algorithmic management [Lee et al., 2015, Wagenknecht et al., 2016], and emotional labor [Raval and Dourish, 2016].

Adding to this body of research, I framed Uber through the lens of Stakeholder Theory [Freeman and Reed, 1983, Mitchell et al., 1997] (an ethical theory that, in part, more broadly frames the responsibilities of organizational management), in order to more deeply analyze and enunciate drivers’ experiences with the platform.

The lens of Stakeholder Theory seems particularly pertinent at this moment in the progression of on-demand platforms. Much in the way that Freeman argued against a managerial style that was wholly justified in regards to *stockholders* [Freeman and Reed, 1983], I argued against a design philosophy that is wholly justified in regards to *consumers*. In other words, as Freeman was reacting in part to Friedman’s claim that “*The Social Responsibility of Business Is to Create Profits*” [Friedman and Miles, 2006], this analysis was reacting to what seems to be the design philosophy of Uber that *The Social Responsibility of Platforms Is to*

Serve Consumer Needs.

In below subsections, I first introduce Stakeholder Theory by outlining the origin of the theory, its development, challenges in applying the theory, and how it has been applied in practice. I then present related work on on-demand labor platforms through the lens of Stakeholder Theory.

2.1.1 Stakeholder theory

Stakeholder Theory is a managerial concept, which was initially in response to the then – and perhaps still – dominant stockholder-centric management model [Friedman, 1970, Jensen and Meckling, 1976]. A *stockholder* is defined as an owner of corporate stock [mer, 2017b], whereas a *stakeholder* is defined as someone who is involved in or affected by a course of action [mer, 2017a]. The type of stockholder-centric management model that Stakeholder Theory is in reaction to, is embodied by Milton Friedman’s claim that “*The Social Responsibility of Business is to Increase its Profits*” [Friedman, 1970]. Specifically, Stakeholder Theory argues against the notion that all management decisions should be guided by their impact on stockholders [Freeman and Reed, 1983]. Instead, one of the foundations of Stakeholder Theory recognizes that a core management responsibility is the general obligation to maintain an equitable and workable balance between the interests of stockholders, employees, customers, communities, and general public at large [Abrams, 1951]. They argue that this outlook aligns with the original reason for the corporate entity to exist in the first place, which was in part because of their ability to serve the broader community and all of its stakeholders [Ackoff, 1981]. Of course, theorists recognize that balancing these interests is quite difficult in practice due to the complex, contradictory nature of the different interests involved [Dill, 1975].

One device that stakeholder theorists have used to deal with the complexity of balancing various stakeholders is varying the scope of stakeholder identity and legitimacy. Inspired by Igor Ansoff’s work in the early 1960s, Freeman and Reed proposed a *wide* definition and a *narrow* definition of a stakeholder [Freeman and Reed, 1983, Bevan and Werhane, 2010]: in the *wide* definition, a stakeholder is any identifiable group or individual who can affect the achievement of an organization’s objectives or who is affected by the achievement of an organization’s objectives; whereas in the *narrow* definition, stakeholder is identified as any group or individual on which the organization is dependent for its continued survival [Freeman and Reed, 1983]. In this analysis, I use the *narrow* definition of stakeholders, where the core stakeholders are the Uber company (i.e., shareholders, employees etc.), drivers, and passengers. That said, other external stakeholders (e.g., taxi drivers, community etc.) exist according to the *wide* definition, I am leaving the examination of these stakeholders for future work.

As part of the on-going effort in the theoretical and normative underpinnings of

Stakeholder Theory [Zakheim et al., 2008, Freeman and Reed, 1983, Mitchell et al., 1997], researchers have argued for various normative cores of stakeholder theory [Zakheim et al., 2008]. That said, the various cores are not necessarily thought of as mutually-exclusive and many proponents are pluralists [Freeman, 1994]. One of the more significant cores argues that the stockholder-centric management theory is morally suspect and is no longer a workable model for strategic and organizational management [Freeman et al., 2007] – this is sometimes referred to as the *Kantian core* [Phillips et al., 2003, Evan and Freeman, 1988]. One of the underpinnings of this core is the rejection of the *separation thesis*, which assumes that business and ethics are contradictory of each other. Instead, Freeman argued that companies should ask for the purpose of its existence beyond profit [Freeman, 1994]. Another core centers around stakeholder relationships being mutually beneficial and relatively just, in that they should require mutual sacrifices proportional to the benefits accepted [Phillips, 1997] – i.e., the *fairness core* [Phillips et al., 2003]. Last, the *feminist* core frames organizations as a network of relationships [Burton and Dunn, 1996]. Recognizing the relatedness of stakeholders means that an individual stakeholder cannot succeed without the success of other stakeholders.

Since the early phases of Stakeholder Theory, researchers have recognized and argued about the difficulties in actually applying it [Hasnas, 1998, Marcoux, 2003, Palmer, 1999, Marens and Wicks, 1999, Phillips et al., 2003]. As one might expect, some have argued that a manager’s responsibility is to utilize their resources in pursuit of the specific purposes for which that business is constituted [Hasnas, 1998]; others claim that the fiduciary responsibility of business are downplayed by Stakeholder Theory [Marcoux, 2003]. In response to this argument, stakeholder theorists posit that this obligation should not be absolute, and that including stockholders as an important stakeholders is not anathema to the theory [Palmer, 1999].

Another challenge is the claim that it is impossible to manage and maximize competing interests or values among the different stakeholders [Mitchell et al., 1997, Jensen, 2001]. This argument is a bit of a straw man, in that Stakeholder Theory is not necessarily about maximizing competing interests, or even equalizing said interests; instead it emphasizes the moral obligation of corporations and their managers to take into account the interests of relevant stakeholders [Phillips et al., 2003]. In specific response to this criticism, theorists pointed to the narrow definition of stakeholder, arguing that failing to address these stakeholders’ interests would almost certainly undermine those of the stockholders, therefore managers must – and often do – take into account the interest of stakeholders [Zakheim et al., 2008]. As such, similar arguments can be made for platforms like Uber, where one might argue for serving the passengers above the drivers. We as designers of these platforms, can draw from some of the existing arguments around stakeholders to argue for more equitable treatment of all users of these platforms. In the following section, we look at how Stakeholder Theory is used in the practice of management.

As Stakeholder Theory is meant, in some ways, to provide guidance for managers [Alkhafaji, 1989], there have been a more recent emphasis on how to apply the theory in practice [Ayuso et al., 2006, Wheeler and Davies, 2004, Maignan et al., 2005]. This has manifested itself primarily in firms that practice corporate social responsibility (CSR) [Morsing and Schultz, 2006] or sustainability (in the financial, environmental, and social sense) [Stocchetti, 2012]. Along these lines, Wheeler and Davis found that the good will and social capital of the organization can be generated by applying a broader, more inclusive definition of stakeholders and taking this into account in decision making [Wheeler and Davies, 2004]. In other work, researchers found that proper stakeholder management and identification is crucial for CSR measures to stakeholders outside of the corporation [Maignan et al., 2005]. Sillanpaa [Sillanpää, 1998] further related her experience with the U.K. government-sponsored Ethical Trading Initiative, arguing that external, accountable CSR audits can give corporations a competitive advantage, as stakeholders increasingly expect them to respond to their moral concerns.

Stakeholder Theory has also been relatively adaptive to other applications: healthcare organizations [Werhane, 2000], non-profits (e.g., parks and conservation projects) [De Lopez, 2001], nongovernmental organizations (NGOs) [Thompson and Driver, 2005], and higher education [Heinfeldt and Wolf, 1998]. I envision that there are ample opportunities to apply Stakeholder Theory to Uber and other on-demand labor platforms, with the potential to provide meaningful guidance for building a balanced, effective workplace for all stakeholders and their interests. In the following subsection, I illustrate this potential through framing the literature of ride-hailing platforms via the lens of various moral cores of Stakeholder Theory.

2.1.2 A stakeholder view of existing work on ride-hailing and other on-demand platforms

There have been a number of studies that investigated the various practices and experiences of workers on rideshare platforms [Kasera et al., 2016, Ahmed et al., 2016] and crowd-based platforms [Martin et al., 2014, Martin et al., 2016]. These studies, particularly in the crowd-sourcing domain, often aim at highlighting stakeholders that have been marginalized or forgotten, at times trying to interrupt power imbalances [Hanrahan et al., 2015, Kittur et al., 2013] and the invisibility of workers [Martin et al., 2014, Irani and Silberman, 2013] on these platforms. This is quite plainly parallel to Stakeholder Theory’s response to stockholder-centric philosophy, in that corporations are making design and management decisions primarily in regards to how it will impact customers at the expense of workers. Therefore, it is appropriate to use the framing of Stakeholder theory to unpack existing literature in terms of the different moral cores.

One of the first moral cores in the literature is the *feminist* one. Early on, researchers recognized that these platforms were heavily mediating, if not under-

mining, the relationships between stakeholders and that it would benefit both the worker and the organization to better support these relationships [O’Neill and Martin, 2013]. At the same time, this core can be seen when researchers called to attention the the invisibility of workers within these relationships and the disproportionate accountability of each stakeholder to one another – often in favor of the customers [Irani and Silberman, 2013, Martin et al., 2014]. Building on this, researchers began to more specifically examine how the platform mediates the relationship between stakeholders (e.g., drivers and riders or Turkers and requesters). That is, on these different platforms there are information and power asymmetries between the customers and providers that are in favor of the corporation’s interests at the expense of either the drivers [Rosenblat and Stark, 2016] or Turkers [Hanrahan et al., 2015]. As I see it this core is continuing to be engaged by the work in algorithmic management [Lee et al., 2015], where the algorithm is – in effect – mediating much of the relationship between the driver and passenger. It seems that these platforms stand in the way of forming more equitable relationships among stakeholders.

One example of a knock-on effect of these asymmetrical relationships is the things that they do not take into account, e.g., the role that emotional labor plays in navigating these mediated relationships. On ride-hailing platforms, drivers go to great lengths to ensure that they are competitive with the experiences that other drivers are providing – activities which are not accounted for or remunerated [Raval and Dourish, 2016]. Another knock-on effect of this asymmetry is illustrated by how bias is practiced on the various platforms [Hanrahan et al., 2017, Rosenblat et al., 2016, Thebault-Spieker et al., 2015, Hannák et al., 2017]. For example, race and gender were found to be correlated with performance metrics (which impacts opportunities for new assignments) [Hannák et al., 2017, Rosenblat et al., 2016], or even – in the case of AirBnB – is associated with lower remuneration [Edelman and Luca, 2014]. In part, these biases are rooted in how the functionality and anonymous structure of these platforms lead to a lack of accountability in the relationships that they claim to support [Hanrahan et al., 2017].

Contemporaneously to the works that adopt the feminist core, researchers started to engage with what I see as parallel to the *fairness core*. That is, researchers began to specifically call into question how the benefits of these implementations and capabilities of these platforms were structured in regards to all stakeholders [Kittur et al., 2013]. In this line of work researchers examine different directions of functionality that might make these platforms more beneficial to workers in terms of better pay, more engaging work, and career advancements [Kittur et al., 2013]. I would argue that much of the work examining remuneration falls into the fairness core (e.g. [Callison-Burch, 2014, Ipeirotis, 2010]).

While not completely separate from the fairness or feminist core, the *Kantian* core is embodied by work that looks specifically at the workers’ situation and calls into question the ethical sustainability of the platform approach. For example,

Martin et al. [Martin et al., 2014] specifically call into question the low pay, opaque policies, and precarious position of these workers. Other work has highlighted the amplified uncertainties of workers on ride-hailing platforms in regards to driver and passenger welfare [Ahmed et al., 2016, Kasera et al., 2016], unfair labor practice [Kneese et al., 2014a], as well as low-income labor [Rogers, 2015].

Admittedly, these cores do not provide an absolute categorization or taxonomy of the existing work – no one piece of work fits perfectly into a single categorization. However, these cores provide different lenses that one can apply to various phenomena to engage different questions and issues with respect to stakeholders on platforms like Uber.

2.2 Part-time Work

In this section, I first present the gap in previous literature discussing part-time work under a fissured labour market accelerated by digitization in a transitioning economy [Weil, 2014]. I will then review some of the discrepancies in recent research in discussing both the challenges of ride-hailing work and a growing workforce. Lastly, I highlight the need for considering the broader context in which drivers’ choose to drive for ride-hailing and the opportunities to view their work within the constellation of gigs and jobs that they stitch together to make a living.

2.2.1 Part-time employment in a digitized labor market

Part-time employment is widely considered as inferior when compared to full-time employment in various contexts [Nightingale, 2019]. Much of literature on part-time work originates from studies in European countries, discussing numerous topics including wage [Jepsen et al., 2005, Hirsch, 2005, Hardoy and Schøne, 2004, Tönurist et al., 2014], gender [Bardasi and Gornick, 2008] and social inequalities [Blossfeld and Hakim, 1997]. In light of the recent rise of digitization in job markets, many sectors are highlighting an almost irreversible uptick in part-time, temporary employment, in replacement of the traditional full-time long term employment [Davis, 2016]. According to Davis, this on-going transition is largely caused by a shifting market from traditional *corporate* dominated labor market to a *platform* dominated market, where the majority of workers on the platform are on-demand workers without any contractual relationship [Davis, 2016]. In addition, Weil contended that workers are in various stages of transitioning from primarily full-time employment to part-time, temporary gigs [Weil, 2014], which is accompanied by a variety of disadvantages or ‘penalties’ [Fagan et al., 2014] in this transition process. The growth of an increasingly digitized economy, catalyzes this transition, where millions of workers are forced to work anxiously, fearing the ultimate loss of their jobs due to automation [Goldberg, 2018]. One example of such digitized workplace, is the on-demand gig market, which facilitates part-time,

temporary work in which around 57 million people are participating – which is over one-third of U.S. workers [McCue, 2018]. While studies of gig-work and workers experiences have focused on the precarity of the gig market as a result [Raval and Dourish, 2016, Kneese et al., 2014a, Rosenblat and Stark, 2016], literature has yet to fully consider the role of part-time in working on and using these platforms, which is an important feature of gig work. This dissertation continues the discussion of the fissuring workplace [Weil, 2014, Davis, 2016] under the context of ride-hailing platforms, and explore the role of part-time work in using these gig platforms.

2.2.2 Ride-hailing Work and a growing on-demand workforce

Ride-hailing platforms have largely been criticized for the manner in which they mediate work [Raval and Dourish, 2016, Kneese et al., 2014a]. As such, Lee et al. coined the term “algorithmic-management”, to illustrate and explain how the platform takes on management roles in assigning work and evaluating workers [Lee et al., 2015]. On the same subject, Ma et al. argued that the specific design of features on these platforms, represent managerial acts and should therefore be understood and analyzed through the perspective of managerial ethics [Ma et al., 2018]. Due to the opaqueness of the platform designs, and the difficulty in properly operationalizing the many nuances and details of human interaction, Rosenblat et al. argued that these platforms create or facilitate asymmetries in information and power, where these asymmetries regularly favor the corporations’ interest [Rosenblat and Stark, 2016]. One example of this asymmetry is the rating system in ride-hailing platforms, where workers are known to both experience and practice bias [Hanrahan et al., 2017, Rosenblat et al., 2016].

This has led others to argue that the rise of automated platforms like Uber and Lyft have unsettling implications for low-income labor [Rogers, 2015], specifically around the transformation of labor from the traditional taxi [Mcgregor et al., 2017]. Researchers have consistently argued for platform managers to pay more attention to fair labor practice [Kneese et al., 2014a, Martin et al., 2014, Kittur et al., 2013].

While scholarly work and the popular have been recognizing the consequences of moving towards the digitization of on-demand work through studies of on-demand work [Lee et al., 2015, Rosenblat and Stark, 2016, Ahmed et al., 2016, Kasera et al., 2016, Martin et al., 2014], the number of workers joining the on-demand platforms are steadily increasing [jpm, 2018, Inc, 2018]. This situation motivates further investigation on why and under what circumstances drivers choose to work and what keeps them working on the platform. Particularly, I seek to fill the gap of taking into account workers’ background and context around their work, which complements the prior work which focused more on how platform algorithms impact workers’ practices on the platform [Lee et al., 2015, Martin et al., 2014]. For

instance, while Raval et al. studied crowd workers’ emotional, body and temporal labor [Raval and Dourish, 2016], it looks specifically at these factors while on the job, I aim to build on this by looking at how working on these platforms fits into their lives and how this impact platform usage. That is, this previous work provides meaningful and valuable insight into the work of on-demand workers, however, to further unpack why drivers drive and how they fit this work into their lives, it is important to understand who they are, what their interest in doing the work is and what their circumstances or context is while working on the platform.

2.2.3 Recognizing the contexts in ride-hailing work

Studies of work have argued that in order to understand work, one must focus not only on the practice and the activities of work, but also the context [Hanrahan and Carroll, 2017] and the social order that constitutes work [Garfinkel, 1967]. This is especially true for a platform that instantiates a large amount of social interactions and transactions such as ride-hailing platforms. Prior studies on ride-hailing work have mainly focused on the experiences and practices of drivers as a direct result of the platform mediation [Lee et al., 2015], where much of the criticisms have focused on the experience of working on single platforms [Ma et al., 2018, Raval and Dourish, 2016]. However, these works overlook the underlying background of various drivers’ reactions to the platform, which are often grounded within individual drivers’ life and other work arrangements.

For instance, Kasera et al. found that drivers in Namibia often had to work collaboratively to arrange rides with passengers [Kasera et al., 2016], and Gloss et al. recognized the platforms may “de-skill and re-skill” some workers through the management of ride-hailing platforms [Glöss et al., 2016]. However, these observations stopped at the experiences and practices of drivers that is directly related to the very actions of the work, but did not delve into what has led to the contexts of “collaboration” [Kasera et al., 2016] or the “de-skill and re-skill” [Glöss et al., 2016] into a drivers’ work life. On the other hand, Ahmed et al. not only acknowledged the lack of recognition in drivers in India facing uncertain assignments, but also brought attention on drivers’ varied concerns on welfare [Ahmed et al., 2016]. This trend of tapping deeper in social contexts of ride-hailing is also presented in exploring the interaction between drivers and riders, where Kameswaran et al. recognized the potential of social and cultural capital situated within the interaction and conversations, this observation provided a new angle of viewing platform beyond its direct goals [Kameswaran et al., 2018]. Most recently, Kumar et al. expanded the vision of understanding ride-hailing work through recognizing the social relations facilitated by the practice of work and how that affects social justice and mobility [Kumar et al., 2018]. These efforts, in different ways suggest the workers’ practice and use of the platform that impact and meanwhile, impacted by the various exterior factors within their social contexts.

These contexts in drivers' work life are important pieces of the puzzle to explain the meaning of ride-hailing work for drivers and what lead to their practices.

2.3 When is it Sharing and When is it a Gig

Along with the exponential growth in on-demand economy, particularly in the ride-hailing sector, the discussion around it has been accompanied by a muddying between the sharing and gig economy, and it has become unclear when an activity is sharing a resource vs. providing a service. In this section, I intend to provide a review of these discussions and draw a contrast while acknowledging the connections between the two concepts.

2.3.1 A spectrum of sharing activities

Researchers seem to have been working with Sharing Economy using their own loosely defined meanings [Oh and Moon, 2016]. In calling for a shared understanding of sharing economy, Oh et al. reviewed a wide range of literature featuring platforms that were more communal (Wikipedia, NeighborGood, and CouchSurfing) to ones that were more commercial (Uber, Lyft and Airbnb) [Oh and Moon, 2016]. These definitions of the sharing economy that the authors found, each highlighted how different aspects of the relationship (e.g., accessibility, trust, value creation) feature in the different peer-to-peer transactions [Oh and Moon, 2016]. While Oh et al. 's work provide an overview and grouping of definitions, their work was not intended to enunciate the differences between various sharing economies and platforms.

These differences were enunciated by Lessig [Lessig, 2008], where he put peer-to-peer exchanges on a spectrum where on one end there are the exchanges that happen around a tangible value such as money, and on the other end are ones that depend on intangible values such as friendship, and he acknowledged that some exchanges depend on different ratios of the two [Lessig, 2008]. In using this concept to categorize these different exchanges he defined: the commercial economy, where money is the center of the transaction; the sharing economy, where intangible value (such as friendship) is the center of the transaction; and lastly, the hybrid economy where the exchanges embody both the commercial and the sharing economy [Lessig, 2008]. This definition provides a conceptual spectrum where platforms that fit in the commercial economy (e.g., Amazon) fall on one end, platforms that fit in the sharing economy (e.g., timebanking) fall in the other end, and platforms in the hybrid economy (e.g., Airbnb, Uber, TaskRabbit) fall into the middle.

A similar perspective was put forward by Klein et al. , who framed these exchanges around 'social-based' and 'money-based' systems in home sharing context, the particular exchange that they contrasted were the interactions between hosts and guests' in Airbnb and Couchsurfing [Klein et al., 2017]. Klein et al. found

that between these two examples there were differences in the expectations around quality, degree to which the exchange was service oriented, and the power relationships. Extending this work into ride-sharing, the consequence of sharing in the new context is markedly different from home-sharing. Although both exchanges are non-money-based transactions [Benkler, 2004], riders and drivers both largely live in the same communities and – in the carpooling case particularly – sometimes share some common cultural backgrounds. My investigation of carpool groups outlines how these commonalities impact interactions between drivers and riders in local communities and help them to form relationships.

Many of the positive aspects of the sharing economy are based on collaborative consumption [Botsman, 2013], which emphasizes the promise of sustainable use, redistribution of underutilized assets, and access over ownership [Botsman, 2013, Hamari et al., 2016]. Although these ideals (particularly in Lessig’s definition) were originally – and can still somewhat be – attributed to many of today’s most influential hybrid platforms, such as Uber [Cusumano, 2015, Erving, 2014] and Airbnb [Geron, 2013], over the years these platforms have moved away from what was once considered sharing and have leaned more towards commercialization and gigs. Within this spectrum of exchanges, it seems clear that the currency – whether it’s money, or relationships – shapes the way the exchange is carried out. However, in investigation of carpooling I found that these axes of classification did not adequately capture the differences in practice between carpooling and ride-hailing, as they ostensibly occupied a similar position in the hybrid space.

2.3.2 The ideals of community sharing

While sharing, swapping, and trading have been a part of human society from time immemorial, advances in information technologies have enabled people to participate in community sharing activities at a scale that may not have been feasible in the past. Ideally, these advances can help communities to achieve an increased sense of togetherness, share kindness, or to better utilize idle resources [Botsman and Rogers, 2011]. However, this ideal case is not always achieved, so researchers have endeavoured to find out how and why people were sharing on these platforms, and studied people’s motivation for participating on these platforms [Bellotti et al., 2015, Hamari et al., 2016]. These investigations leaned on behavior theories such as self-efficacy [Bandura, 1977], reasoned action [Ajzen and Fishbein, 1980], and self-determination [Ryan and Deci, 2000]. In particular, self-determination theory expands the concept of intrinsic and extrinsic motivations, which was initially from the two-factor theory [Herzberg, 1966], which contends that people’s motivation resides on a spectrum, where: intrinsically motivated people become self-starters who genuinely take pleasure in engaging in an activity; whereas extrinsically motivated people are more sustained by factors such as financial gain, direct reciprocity, or reputation [Hamari et al., 2016].

In the sharing end of the peer-to-peer spectrum is the canonical example of timebanking, where participants are generally more intrinsically motivated – but not wholly so – as participants are seeking to provide services for time-credits (not monetary gains), and expect that they will be able to use these time-credits to obtain a service from someone else [Carroll, 2013]. In this way both the contributors and receivers are both coproducing the activity and community. On the other hand, many business-to-consumer or consumer-to-consumer markets are more motivated by participants’ extrinsic motivation – primarily self-benefiting factors such as utility or cost savings [Möhlmann, 2015]. It’s worth noting that we don’t believe that one form of motivation is superior than the other, rather that they present different opportunities and requirements for platform design.

On hybrid platforms, such as ride-hailing ones, the exchanges can be quite mixed in terms of intrinsic and extrinsic motivation [Bellotti et al., 2015]. For instance, ride-hailing drivers were found supporting riders with visual impairments and forming relationship with them (for potential future transactions), while at the same time feeling that they were contributing to the social good of their community [Brewer et al., 2019]. In this dissertation, I present exchanges in carpooling groups, whose motivation can be seen to be primarily instrumental [Bellotti et al., 2015] in that they wanted to get from point A to point B more cheaply. However, the manner in which these activities were enacted – and the benefits incurred – contrasted with those of ride-hailing platforms which has a similar, instrumental motivation behind the exchange. I also highlight the relational labor [Brewer et al., 2019, Baym, 2018] involved in how carpoolers connect and reconnect for future trips played out through form of long-term relationships in sharing a carpool.

2.3.3 Exchanges in ride-hailing

Researchers have also investigated the promises and the challenges specifically in ride-hailing platforms. Due to the fast growth of platforms like Uber and Lyft, much of the research around ride-hailing has revolved around the practice and activities on these platforms and their impacts on workers [Lee et al., 2015].

On the more positive side, researchers continue to find social benefits from engaging in ride-hailing activities. For instance, Kameswaran et al. found that the ride-hailing interaction between drivers and riders provides space for generating social and cultural capital for distressed communities [Kameswaran et al., 2018]. Similarly, Kumar et al. expanded the vision of understanding ride-sharing work through recognizing the social relations facilitated by the practice of work and how that affects social justice and mobility [Kumar et al., 2018].

On the other hand, as discussed in earlier sections, researchers have framed ride-hailing as a workplace [Lee et al., 2015, Rosenblat, 2018, Ma et al., 2018] in different social contexts [Chen et al., 2019, Kasera et al., 2016, Glöss et al., 2016, Ahmed et al., 2016] – similarly to other gig-platforms [Martin et al., 2014].

As much as Uber or Lyft advertises the benefit of “flexibility”, “freedom” and “being your own boss”, research has found that drivers for ride-hailing platforms are primarily motivated to make money [Ma et al., 2018], while at the same time, riders primarily consider drivers to be providing them with a service [Rosenblat, 2018, Calo and Rosenblat, 2017]. Within these interactions with riders, drivers face information and power asymmetries [Rosenblat and Stark, 2016], as a result there is unaccounted, emotional labor from drivers to gain rider’s appreciation and confirmation [Raval and Dourish, 2016]. Part of this dynamic is manifested in the rating system [Rosenblat et al., 2016], where drivers have experienced and exercised bias against riders from ride-hailing platforms [Hanrahan et al., 2017, Thebault-Spieker et al., 2017].

Reflecting on the benefits and promises that ride-sharing activities could bring about [Kameswaran et al., 2018, Kumar et al., 2018], as well as the current challenges in the ride-hailing services [Hanrahan et al., 2017, Isaac, 2014], I intend to unpack the benefits and challenges of ride-sharing in a unique carpooling context and expand the current understanding of sharing economy with a more granular perspective.

Study 1: Using Stakeholder Theory to Examine Drivers' Stake in Uber

To understand drivers' stake in a ride-hailing platform, I conducted a content analysis on one of the most popular Uber driver forum. In below sections, I first introduce the method in which the data are collected and analyzed, I then present findings from this analysis.

3.1 Method for Study 1

As drivers work in distant locations, there's not a physical work place to talk to each other. Therefore, I collected data from one of the most popular Uber driver (who often also drive Lyft and other ride-hailing services) forum. In this work, I have primarily borrowed the approach used in Martin et al.'s work examining Amazon Mechanical Turk [Martin et al., 2014]. That is, when collecting our data on the Uber forum, I selected posts that seemed to ring true to the community and were not just an isolated, unique phenomena. However, instead of using a more ethnographic approach to understand the data, I iteratively coded the forum posts and met my collaborators numerous times to ensure transferability, credibility, and trustworthiness, which are the criteria used for evaluating qualitative data. In the following, I present data collection, sampling strategies, and data analysis in this process.

3.1.1 Data collection

I took an exploratory approach to analyze one of the most active Uber forums, which has 93,000 active members and over 150,000 discussions. The average num-

ber of users on this forum at any given point is around 1,000. It seemed to us that most of the active members were U.S.-based and the discussions were overwhelmingly in English.

The forum is divided into many sections, and I mainly focused on the most active sections: 1) the *Advice* section (containing over 9400 threads) where drivers seek help, suggestions, techniques, and answers regarding different practices; 2) the *Complaints* section (containing over 6300 threads) where drivers express their emotions and react to others'; 3) the *News* section (containing over 4600 threads), which holds discussions of major press coverage related to Uber; and 4) the *Technology* section (containing over 2500 threads) where drivers discuss their apps, software, phone, GPS, and dashboards. I did not include less active or less relevant sections; for example, "people", "pay," and "stories" also attract much use, but not included in the analysis because "people" was used for self-introduction on the forum, whereas posts on "story" and "pay" overlapped with contents on "complaints" section. I have captured data posted back from January of 2014 to April of 2017 and analyzed a total of 1132 threads. Specifically, there were: 234 threads in *Advice* section; 352 in *Complaints*; 339 in *News*; and 207 in *Technology*. To verify issues that were discussed on the forum, I sometimes cross-referenced Uber official policies and media coverage.

3.1.2 Sampling strategies

The sheer volume of content on the forum made it impossible to qualitatively evaluate every post. Uber also updates their service (e.g., UberPool was introduced later) in ways that sometimes render some posts obsolete, which I excluded from analysis. To start our analysis, I first selected "most recent" threads (in order to reflect the most up-to-date practices) and threads that contain more than 50 comments (which serves as a primary way to determine the importance and relevance of a topic). I did make a few exceptions if a particular thread had an interesting topic or discussion, but had fewer than 50 comments. For threads with duplicate themes, I did not include them if they did not provide new information. Along these lines, I also stopped including posts within a thread when we had reached saturation.

3.2 What is at Stake for Drivers in a Ride-hailing Platform?

This analysis uses the narrow definition [Freeman and Reed, 1983] of stakeholder in which stakeholders are the parties that constitute the very existence of an organization and at the same time, depend on the organization in order to achieve their individual goals [Freeman, 2010]. In Uber's case, stakeholders are the riders,

drivers, and the Uber corporation. Admittedly, it is useful and interesting to take a wider view [Freeman and Reed, 1983] of stakeholder identification where several additional, important stakeholders are identified, e.g., taxi drivers or government officials. However, we did not find many discussions of these stakeholders on the forum and they are not directly involved in the day-to-day practices of drivers.

In this section, I first identify the stakes that drivers have in Uber (i.e., "what is expected and due" to them [Zakhem et al., 2008]) by grounding them in their discussions on how they are being breached, and what the consequences of these breaches are.

3.2.1 Autonomy as a stake

An underlying topic in the drivers' discussion is how they see themselves and their relationship with Uber, and to a lesser extent with passengers. In this context, I use the term 'autonomy' in a colloquial sense when discussing drivers' desired relationship with Uber. Drivers themselves seemed to enjoy and expect the freedom of being self-employed, while at times expressing skepticism about the realities of this classification. As Uber is officially concerned, they frame drivers as "partners"¹ and their legal designation is as independent contractors. This classification is consistent with drivers' perspective, but at times inconsistent with the actual practice of Uber [Rosenblat and Stark, 2016]. From drivers' conversations, some of Uber's policies and functionalities treat drivers more as employees and less as independent contractors. This goes against the drivers' expectation and stake in this relationship; they interpret themselves as having less responsibility towards Uber.

"Uber drivers are not employees, they are private contractors, so they get to choose what work to bid on[...]" (D1)

A primary manifestation of this stake is that drivers feel that they should have more control and agency over the types of jobs that they take. That is, as drivers understand it, they are working on their own terms due to the nature of the relationship between themselves and Uber. As such, they take their freedom to do business their own way quite seriously and chafe at some of the controls implemented by Uber. One forum user indicated that if Uber does want to be able to exert control over the types of rides that a driver takes, then the relationship should be changed.

"Whether or not I can make the money I need to make by going 20 minutes away or even an hour away is my business, NOT THEIRS!!!! If they want it to be their business, then I become their employee. So

¹<https://help.uber.com/partners>

as long as Uber wants to keep drivers as independent contractors and not employees, passengers who are long distances away from drivers are just going to have to hope drivers are willing to come get them[...]"
(D2)

In the above example, the forum member considered that Uber is more concerned about providing complete coverage for the rides requested, as opposed to providing rides that are ‘worth it’ to the drivers. The assignment functionality is one place where the tension between how drivers view what is due to them (i.e. their stakes) and what Uber provides them. This is seen in the presentation of a ride request to drivers, where drivers experience a “random” quality to the requests. In the example below, the driver continues to explain how they had no input into the parameters of their requests.

“Uber just randomly sets the distance that I can get a request from. I had no say in it. They didn’t ask me. They just set it. And they change it from time to time, again without any of my input at all.” (D2)

This randomness is experienced both as a breach of their stake in the interaction and as a lack of agency. It is compounded by the fact that drivers have less than 15 seconds to decide whether to accept or reject the request without being able to know what constitutes the request, such as the destination and pick up location of the request. This becomes more important for drivers when the base pay rate is low, as they have to be extra cautious of requests that are far away, but the distance of the ride is quite short. In other words, it costs more money to get to the pickup location than the ride would pay. Drivers seem to be constantly calculating the cost-benefit of all rides, without support from Uber.

“I got a ping to a very rural address 18 minutes away. I sent a text, asked the passenger where he was going. He sent back an address, about .7 miles away from the pickup location in his same shitty backwoods neighborhood.” (D5)

That is, much in the way that Stakeholder Theory recognized that managerial decisions were justified solely in regards to how they would impact stockholders [Freeman and Reed, 1983], in Uber’s case, drivers perceive that decisions around policy and functionality are made solely in terms of their impact on passengers. At times this makes it seem like Uber wants all of the benefits of having employees, without any of the responsibilities. This seems to be a violation of the *fairness* core in Stakeholder Theory, where the various stakeholders have sacrifices proportional to their benefits. This breach is recognized and discussed by the drivers.

“make no mistake..you’re a cab driver using an app to be connected with fares. they use the term rideshare to get around all the legalities of it.”
(D3)

Even with this recognition, the majority of drivers still framed themselves as independent from Uber, in that they were *sharing rides* and *not* providing conventional cab services. One manifestation of this perception was that some drivers drew a clear boundary between their responsibilities to passengers and Uber's responsibility to passengers. That is, they framed connecting drivers to passengers as one of the passenger's or Uber's stakes, and not their own. Mainly, some drivers did not feel terribly obligated to find a passenger once they had arrived at a pickup location.

"I have literally come to the pickup spot and I see the eventual passenger right away [...] After 3 minutes they get in realizing I am their Uber and ask why I didn't call to them. Like I'm supposed to shout out "Pedro, where are you ?" to everyone I see [...] The system is designed for the pax to find the driver, not vice versa. " (D4)

Within this interaction, the driver had chosen to share a ride, but they did not feel it was their responsibility to guarantee that a passenger was picked up. In this example, the passenger did seem to expect that it was the driver's responsibility to identify and arrange the pickup with the passenger. This shows how what is due to each party is unclear at times, such as whether or not the rides on Uber are a collaboration between partners, or a service provided to passengers.

3.2.2 Earnings/expenses as a stake

Obviously, a clear expectation of what is due to drivers is that they will earn a reasonable wage that is more than what covers their expenses, as one of their primary motivations to drive Uber is to make an extra buck [Lee et al., 2015]. Drivers seem to be constantly performing cost-benefit calculus while working on the Uber platform.

In terms of the fare on Uber, each one is calculated by adding a base fare, time, and distance rates, after which Uber takes a cut of around 25%. In addition to this cut, passengers are also charged a booking fee (approximately \$1-2) on each ride². On top of this, the base fare rate varies depending on demand and can drastically change the cost-benefit of driving at a particular time, as one driver explains:

"Most of us are at \$.75/mile, which means \$.60 after uber cut, which means \$.30 if only half ur miles are paid (typical). So you actually LOSE \$.27/mile (using IRS \$.57). You LOSE a little on each trip, but can try to make it up on volume!" (D6)

Aside from this base fare rate, drivers have to budget for a variety of expenses such as gas, car maintenance, tolls, taxes and local fees. Experienced drivers

²<https://www.uber.com/info/how-much-do-drivers-with-uber-make/>

outlined the additional “*accessories*,” which were divided into “*suggested basics*” and “*optional items*”. “*Suggested basics*” include, among other things, a car phone holder, sickness bags, wet wipes, water, and mints. “*Optional items*” include items like a dash camera for recording inside and outside of the car, battery vacuum cleaner, and a large towel. In a different thread, a driver shared their budget from a month that was “*high maintenance*”. This itemized budget showed that the driver was making around \$9/hour working 120 hours for the month, far from what Uber had advertised. Admitting that this is not a typical month, the driver speculated:

“The fact of the matter is this, of course maintenance costs will have ups and downs and looking at any single month or repair job is not the whole story. ...but there is almost nothing that I can think of to justify the low roi (return on investment) on my time if this single maintenance job is a precursor to others.” (D7)

One expense that new drivers did not seem to factor in the cost-benefit calculus was car depreciation. This depreciation was part of why experienced drivers often did not recommend starting with ridesharing. After a certain amount of driving, the profit margin for drivers goes down due to increased expenses on car maintenance, taxes, and depreciation, and at times the driver only breaks even. One full-time driver explained how they ended up in a worse economic situation than when they started Uber:

“Did my taxes and can’t pay it[...]. Now i have a huge IRS bill of \$5000 i can’t pay. Uber their low rates, pool rides and high percentage they take after car repairs, etc i totally now broke and forced into bankruptcy. I voluntarily gave my car back to bank, 50,000 miles in 9 months most all the money went to repairs tires brakes and huge car payment so bad i’m now bankrupt.” (D8)

Drivers are unable to make adjustments to their cost-benefit calculus by setting their own prices; they can only opt-out when the price is too low. This is somewhat contradictory to the “partner” or independent contractor status of drivers, and calls into question the ethical sustainability of this model (i.e. the *Kantian core*). In this case, the independent contractor has only indirect input into Uber’s pricing. One case that we came across in the forum was a driver who was frustrated when Uber breached their expectation of providing support and having some amount of concern about their ability to earn a living. In this case, the driver had received support from Uber to “put” them into a new car³. However, once the driver had

³Uber’s official website under Vehicle Solutions: Need a car? We can connect you to partners who offer exclusive vehicle deals that can get you on the road and earning. Many offer no mileage caps and flexible return policies so you can drive and earn as much as you want. <https://www.uber.com/drive/>

committed, Uber dropped their rates and made changes in the calculus of driving full-time with Uber.

“Uber is freaking scam they put me in new car then they drop the rates ! How I m gonna pay for it now ? I had to sell my other car !! Driving pax in brand new car for 0.90 cents a mile what a joke !! ” (D9)

3.2.3 Managing stakes with the Uber platform

Drivers’ stakes of autonomy and earning seem to be tightly coupled with each other in many of the interactions that are mediated by Uber and its platform. Drivers discussed many specific features that Uber had implemented on its platform and how they led to a variety of challenges and breakdowns. Many of these challenges were centered around satisfying the stakes outlined in the previous sections.

A theme often discussed in these threads was the high degree of automation in managing and coordinating rides, a key set of functionality that Uber relies on to function, which recalls a bit of the *Feminist core* in how Uber and the platform are mediating and structuring relationships and defining ‘good’ outcomes. For instance, while drivers certainly recognize that automation is necessary to implement a system like Uber, the role the algorithms and functionality currently play seems somewhat at odds with drivers’ view of themselves. In order to satisfy drivers’ stake of earning, this more *laissez faire* algorithmic management style requires them to sacrifice the very autonomy, to some extent, that attracted them to Uber. In this way, Uber and its platform appear as the operating authority by which drivers are feeling controlled and managed, as opposed to drivers leveraging the platform to independently make decisions and exercise control.

“Year of the driver my a\$\$! Just another way for this ridiculous company to control us so called independent contractors. I don’t pickup at high schools, Wal-Mart’s and other such type places from past experience so I know the addresses when they pop up and I can just ignore them. We know Uber doesn’t deactivate for low acceptance so I could care less what mine is. Now of course the pickup address is hidden and you can’t tell from the map where the pickup really is essentially forcing acceptance. Only then can you see the address and will have to take it or cancel which will increase cancel rate and lead to deactivation. These scumbags know exactly what they are doing, more control, more opacity leaving the driver little choice in how to operate independently!” (D10)

That is, while Uber and the drivers frame themselves as independent contractors, the platform lacks this nuance. Instead, it assigns tasks to drivers and dictates

the parameters and remuneration around these tasks, treating drivers more as employees and less as independent partners. Drivers however, look for ways to protect their stakes and assert their agency in spite of the platform. In the remainder of this section, we discuss some of the specific instances where drivers discussed how Uber and its platform had breached their stakes.

A common way that Uber breached the stakes of drivers was in a lack of transparency. Transparency was especially an issue when drivers and passengers have different understandings (or a lack of understanding) about the meaning of the interaction and information provided. One prototypical example of this general phenomenon were the discussions around the role of and how they received ratings from passengers. This rating system is ostensibly how Uber leverages passengers to crowdsource the quality control and supervision of drivers, by letting passengers evaluate their drivers' performance [Rosenblat and Stark, 2016]. The drivers expressed their exasperation with the rating system and its lack of accountability,

“Honestly you can’t tell what a Pax rated you. When people say that they were rated 1 it is because they know they said or did something that the Pax would not like and mostly it resulted in a 1 star rating.”*
(D14)

Drivers even at times accused Uber of manipulating the ratings, or at the very least capitalizing on their fears of being blocked.

“There is no accountability from Uber as to the tabulation of this rating, and it seems like they have created an algorithm to automatically down-rate new drivers for the purpose of fear. In other words, the customers are not downrating, Uber are doing it, to manipulate new drivers psychology so they go over the top with service like mints, water etc. Uber have refused to address this topic despite several communications with them.” (D11)

“Rating system works well. Fear of deactivation is a good motivator.”
(D12)

This practice leaves room for non-clarified messages about driver's rating from anonymous passengers, breaching their autonomy to improve their performance. That is, drivers seemed to feel a lack of agency in affecting any meaningful change in these ratings. In the end, experienced drivers noted that because these ratings did not provide much actionable information and they had no idea who made the complaint, they decided that:

“it really doesn’t matter because there is no reward for high ratings. Just gotta make sure that I don’t go below the threshold.” (D13)

Other drivers claimed – perhaps correctly – that passengers do not always know what to base their ratings on. In order to educate passengers – and avoid being blocked by the platform – one driver went so far as to print a sign explaining that a 5 is the only ‘acceptable’ score as far as Uber was concerned, he summarized the surprise of passengers and the breach by Uber.

Having this in my car for a day has blown pax minds. They don't realize a 4= "eff you driver". Be your own Uber marketer since they suck obviously and tweak/provide recommendations. (D15)

Drivers’ frustration with Uber’s rating system, which was rooted in its lack of transparency and accountability with respect to passengers’ ratings (specifically regarding what their complaints were and who made them), sometimes led drivers down a path of suspicion. One driver believed that he suffered from biased ratings, which was particularly problematic as he had just started and was in danger of being deactivated.

“This is my 4th day driving. My rating now stands at 4.64 [...] I just can't figure out why my rating are borderline deactivation level. This is crazy. I'm curious, especially to hear from other young(ish) black male drivers if they are constantly on the borderline as well. ” (D16)

Along these lines, when drivers feel like their autonomy and ability to earn has been breached, there is very little recourse available to them. In several cases, drivers discussed the limited support that Uber provides to drivers on the road, where most of the time, all that the drivers have are the FAQs available in the help menu of the driver app. While Uber *does* have local offices called ‘Green Hubs’ for drivers with emergency issues, drivers discussed how these support stations are staffed by third parties and rarely provide solutions to drivers’ problems. In a thread where one of the forum moderators provided advice to new drivers, they warned that:

“Uber support is well known for not addressing your issue. They simply preprogrammed answers which are based on key words resulting in unrelated responses. You need to persist.” (D17)

Another mechanism that Uber has deployed is *UberPool*, where passengers can join a car that already has passengers. Drivers in the forum almost unanimously declared their commitment in avoiding UberPool because it was a “scam” and it was just “ripping off” drivers. According to drivers, UberPool is designed to have them work “multiple tasks at once” where they could have earned the fares in separate rides. That said, drivers were not completely able to avoid UberPool as one driver explains:

“Uber Pool has been forced onto UberX drivers in many markets. Since it’s a losing proposition, it makes earning a living wage very difficult to attain for drivers. UberX, itself, is actually hard to make profitable in many markets because of the up front costs to drivers and the actual weekly payout. But to force UberX drivers to do Uber Pool is a very unethical thing. Here, look at this thread. People are trying to get out, but they’re being forced to do Uber Pool.” (D18)

Drivers felt that they were being taken advantage of and that they were not earning the amount that they felt was due to them.

Along the same lines of UberPool were the discussions around surge pricing. Surge pricing is employed when there is a higher demand for rides than there is a supply of drivers; the price of a ride increases and those passengers that have an extraordinary need (or extra funds) can still get a timely and reliable ride by paying a higher fare⁴. Each surge usually only lasts a few minutes, and is of great interest to drivers, because the fare can be substantially higher. However, taking advantage of surges proves quite difficult in practice for drivers. This is partly because while a driver may be within a surge zone, picking up a passenger outside of that zoning will not be eligible for surge pricing. A big factor is that, because of the short duration of a surge, it is quite easy for passengers to just wait until surge goes away.

“I cant tell you how many times i’ve in surge zone with no ping [...] as they said its a tool to lure people in [...] Pax are smart now and simply wait it out” (D19)

A lack of nuance in how surges are defined and handled seems ineffective from the drivers’ point of view. Drivers seemed to feel like they were being manipulated or “lured” in and their autonomy breached.

3.2.4 Drivers’ response and assertion of stakes

The structure of and information available for some of the functionality that mediates the interactions between the passenger and the driver is sometimes at odds with the goals of the driver. For instance, drivers are unable to access the destination of a ride prior to accepting it. That said, as outlined in an above example, drivers are not passive in these interactions and still look to protect and assert their stakes, which in this specific case may lead drivers to cancel a ride when they find out the actual destination.

We saw a number of responses and strategies on the part of drivers when it seemed that their stakes were being breached. Sometimes these were relatively innocuous, at other times they directly impacted passengers, and indirectly impacted the Uber corporation.

⁴<https://help.uber.com/h/e9375d5e-917b-4bc5-8142-23b89a440eec>

Something that may impact Uber in the long-term, is the cumulative effect of repeated breaches of drivers' stakes. Many drivers on the forum who were not satisfied with their relationship with Uber and often expressed their suspicions about being exploited and their growing to distrust the platform. In the following example, a driver expressed Uber's lack of effort into developing relationships with drivers as a reason for leaving.

"I haven't driven since last Saturday, and I'm not sure if I will ever go out again. I kind of stumbled into this rideshare subculture while looking for a living wage where I'm at. While it's an interesting world, it certainly is rife with exploitation and treachery [...] What these companies are banking on is a continual churn of new drivers, who obviously can't serve customers as well as seasoned veterans, in order to trap enough into regular driving because of a poor job market and the draw of a quick, though low, dollar." (D18)

Throughout the forum, we came across drivers reporting that they were leaving Uber (of course we had no way of knowing whether this was just 'blowing off steam' or they actually did leave the platform). A main reason that drivers cited was the little amount of effort that Uber has put into maintaining a long term relationship with their 'partners'.

The reported attrition and dissatisfaction of drivers indicates a key argument for Stakeholder Theory, mainly that the corporation exists at the pleasure of the stakeholders [Evan and Freeman, 1988]. Meaning, if Uber suffers from high amount of driver attrition, it will likely impact passengers in the longer term (particularly if there are very few drivers).

A reaction that impacted passengers directly – in fact it was one of the few reasons a passenger would post on the forum – was when a driver, after learning more details about the ride, cancelled the passenger's ride request. In such a thread, a passenger complained that a driver contacted them right after accepting the request to confirm the destination to see whether it is "worth it." After finding out that the ride was too far away, the driver proceeded to cancel the ride. Many of the forum members expressed support for the driver's behavior and explained the reasoning to the passenger. In their explanation, they specifically cite the stake of earning and how they feel that Uber is not doing enough to ensure that this stake is respected. In essence, the manner in which Uber implemented this functionality only took into account how it directly impacted passengers and left drivers out of the equation.

"Unfortunately, sometimes drivers have to do things like that to make sure they don't lose money on a trip. The ride share companies are all too happy to send a driver on a trip that will end up with a net loss for that driver. They could easily make sure that all trips are profitable

with the information they have [...] The fact is that they don't look out for us [...]" (D20)

In another post on the forum, a passenger similarly reported that they were kicked out of a ride once the driver realized it was an UberPool request. Again drivers showed limited sympathy and explained their reasoning directly citing Uber's role in breaching the earning stake.

"Sorry for your bad experience, but Uber either needs to pay drivers more for UberPool trips, let drivers chose to not participate in it, or just get rid of Uberpool all together. It really sucks for drivers. Until Uber solves this problem, it's going to be a problem for everyone involved."
(D2)

These examples clearly show how focusing on one stakeholder at the expense of another, is actually self defeating. In some ways, not properly balancing stakes evokes the very problems that the corporation seeks to avoid.

One rather complicated situation where various aspects of Uber and its platform converged to breach the stakes of drivers, was when they suspected they were the victims of bias. This was especially true when drivers belong to a minority and receive low ratings for reasons that are unknown to them. It is easy for them to speculate – with ample reasons at times – that it is related to a particular bias on account of passengers. That said, in the forums it seemed that biases were being exercised by both drivers and passengers. The functionality where discussions of suspected bias occurred the most was around ratings. In the following quote, a user agreed with a poster who was concerned that they had suffered from biased ratings.

"If I were black and got deactivated I'd be screaming from the hilltops about racism. It's probably THE best argument against the rating system there is [...] But anyone who thinks race isn't a factor (and ageism and sexism) in any system is deluded." (D21)

It seems clear that the lack of transparency behind the reasoning for passengers' ratings opens the door to biased ratings that are unfettered by the system. At the very least, this lack of accountability leads to a lot of suspicions. Drivers even speculated that Uber assigns certain types of people to certain types of areas:

"I think as much as possible Uber tries to send us black drivers into the "hood" [...] To pick up black passengers [...] This morning I was at the air port the 3rd one to go out [...] when I get a ping [...] I look at my phone, and see the pax is 25 min away and has a very ethnic specific name." (D22)

In all cases, the overriding concern was whether or not they would continue to be able to earn on Uber. As a result of all of these factors, fellow drivers encouraged this specific driver to be more selective about what types of neighborhoods or distances that he traveled for his passengers. Some drivers even go so far as to implement their own pro-active biases in response to these perceived threats to their earning potential.

“I’m not ignorant of the racial tensions in this country right now. I’m sure there’s some real animosity. I think there’s something about Rap too that brings out the hate. Now when I see a group of black guys I’m automatically going to just hit cancel. I hate saying that too because I love my black friends but what are you going to do.”(D23)

The impacts of these types of strategies are not lost on the drivers. They are well aware of what is happening and the consequences of their actions. However, they place some amount of blame on Uber, as Uber and its platform do not sufficiently balance their stakes in the workplace.

“Uber has brought back redlining with its boost incentives. It is subsidizing the rides of the well off, mostly white passengers on the west side and leaving minorities and lower income residents in Central LA and South LA with fewer drivers. Uber, [...] are the ones responsible for ride share redlining [...] ” (D24)

"Redlining" is a practice that originates in more traditional taxi companies where the companies refused fares from low-income communities. This practice was dealt with legislation back then, but now seems to be reemerging on Uber [Hanrahan et al., 2017].

3.3 Limitations for Study 1

I have faithfully attempted to depict an accurate picture of the forum as I understood the experience of drivers for Uber; however there are limitations to this study. First, the investigation has focused on the drivers’ perspectives; therefore I base the understanding of other stakeholders on the drivers’ understanding. Second, due to the number of posts that exists in the forum, I applied sampling strategies that fit the research purpose, which may lose some details. Out of twenty-five sections in the forum, I selected the four most related sections for evaluation and omitted others that overlapped or were location specific.

In the forum, I saw many drivers complaining about how little effort Uber puts into things like driver retention. That said, the members who post on the forum are likely a biased sample of the total Uber driver population. However, I believe that this is still a faithful source of experiences presented by authentic Uber drivers.

Study 2: Part-time Ride-hailing

4.1 Method for Study 2

To understand how drivers were structuring their work on ride-hailing platforms, I conducted a qualitative study on drivers' experiences with and around the platform. Note that, although most of the participants drive for both Uber and Lyft, drivers generally used the term 'Uber' to refer to ride-hailing platforms in their answers, and I adopt a similar usage to avoid overstepping the data.

As part of this investigation, I first collected 53 survey responses from drivers through a survey that's deployed in several Facebook driver groups, I also asked if they were interested in a follow-up interview. Among the 53 survey respondents, 35 drivers reported driving in the north-east region of the U.S., 2 drivers reported driving in mid-west, 1 driver reported driving in west-coast and 1 driver reported driving in Canada, the rest of drivers did not disclose their driving location. Initially, 45 drivers expressed an interest in participating in the follow up interview. I reached out to 13 of these 45 drivers by selecting drivers that had an established driving record – which I defined as drivers who have driven for more than 12 months, or who regularly drive for more than 20 hours per week. Out of those 13 drivers that I contacted, 8 drivers agreed to participate in our interview. To supplement the interview data, I recruited 2 additional drivers from our social circle. While the survey was voluntary, drivers who participated in the interview were paid \$15 through cash or PayPal, as we expected each interview to take around an hour.

4.1.1 Survey

To recruit respondents for survey, I posted a link to the survey on Uber driver groups' Facebook pages. The survey consisted of 20 questions, 8 of which were related to demographics and driving conditions (e.g. hours per week driving, months

driven, weekly Uber earnings, age, gender, education, total income level and driving location), 5 short answer questions probing drivers motivation, expectations, and attitudes for driving on Uber; and 7 Likert scale questions probing satisfaction with various aspects of the platform like fairness and information support. The survey also served as a means of recruitment for the interview study.

To analyze the survey data, I iteratively coded drivers responses and identified themes within their responses. To provide an overview of the drivers' employment status and working arrangement, I gathered their responses in hours/week, weekly ride-hailing earnings and number of months driven. In results, I refer to each of the survey respondents as D1, D2 through D53 when citing their responses. I include a list of survey questions in Appendix-B.

4.1.2 Interview

To further understand drivers' context of ride-hailing work, following the survey, I interviewed drivers' to gain insight on 1) how ride-hailing work fit in a drivers' other work life; 2) what are some examples of good and bad interactions between drivers and riders.

I conducted semi-structured interviews in various locations, 4 drivers were interviewed in person (2 local drivers visited to our lab and we visited 2 drivers at their home) and 6 drivers were interviewed via video conferencing. The length of interviews ranged from 40-70 minutes. All interviews were audio recorded, which were then transcribed with automated tools that I have edited and verified by hand afterwards. I iteratively coded the interviews through a process of open coding, axial coding, and memos. During this process, I sat down in weekly meetings with my advisor to discuss the appropriateness of the different codes and themes. In the result, to protect drivers' privacy, I use gender specific pseudonyms to refer to them and their comments to maintain a more nuanced presentation. For the 8 interviewees who are recruited from survey respondents, we present their names and survey ids in Table 4.1. I also recruited two additional drivers Linda and Mike from my personal social circle, who did not complete the survey. I use "college town" to present the local ride-hailing market, and real city names when referring other markets to present a rich understanding of the market factors.

4.2 What does 'part-time' mean for ride-hailing drivers?

In presenting the survey and interview findings, I use participant IDs to label survey takers and pseudonyms for interviewees. Initially, when reviewed the survey results, I was struck by the polarized sentiments about ride-hailing expressed by drivers.

“I don’t expect much from them, they haven’t done anything good for drivers from day one. Right now drivers live in their cars just to make ends meet.” – D44

“Being able to do this for a very long time! [Driving ride-hailing] has been nothing but great to me!!!” – D13

Drilling down to these two survey respondents, I found that D47 and D13 both report household income of less than \$20,000/year, and weekly ride-hailing income between \$500 - \$1,000. However, D47 reported that they drove for 90 hours per week, versus D13 who reported driving 20-40 hours per week. Based on this first comparison, it seemed to us that the number of hours drivers were working per week was highly correlated with their attitude toward the platform and their relationship with the work. For instance, when looking at other drivers’ experience and separating them by the hours they drive, D28 who reported driving < 5 hours per week, was quite positive about their experiences:

“Allows me to set my own hours and where I want to work. Only accountable to myself.” – D28

However, D32 reported driving over 40 hours per week and was more negative:

“I was driving because I lost a job and in the beginning the money was good but slowly over time the money trickled down to nearly nothing or having to work long hours just to make a decent profit.” – D32

Among 53 survey takers, the breakdown in terms of how many hours respondents were driving per week are presented here:

- *<5 hours* - 2 drivers reported driving less than 5 hours, both of whom said that ride-hailing provided a supplementary income and that they would not consider doing ride-hailing full-time;
- *5-10 hours* - 9 drivers reported driving between 5-10 hours per week, their primary motivation was supplementary income and being their own boss;
- *10-20 hours* - 12 drivers reported driving between 10-20 hours per week, their primary motivation (again) was supplementary income, however, they more specifically appreciated the flexible scheduling, and enjoyed meeting people as part of the job. 2 of these 12 drivers indicated more dependence on their income than others, as they were specifically trying to pay off outstanding credit card debt;
- *20-40 hours* - 21 drivers reported driving between 20-40 hours per week, these drivers reported that a significant portion of their income came from ride-hailing, and that they relied on ride-hailing as a source of income;

- *>40 hours* - 9 drivers work over 40 hours per week, 3 of which reported working over 60 hours per week, significant portions of these drivers' income came from ride-hailing.

However, while unpacking these results during our interviews, I found that hours worked and percentage of income were *factors* that shaped drivers' relationship with the platform, at the same time, these factors were part of a more nuanced and representative phenomenon, *financial dependency*. That is, while it is somewhat obvious that the more hours a driver worked the more money they earned, it was not necessarily true that they *depended* on that income more. Also, this level of financial dependency was more of a continuum than a binary classification. We detail this finding in the Section 4.2.1.

Among the interview participants, 9 out of 10 drivers reported that they still worked for a ride-hailing platform, and that 9/10 drivers were working more than 10 hours per week. Only 1 driver reported that they had drawn their entire income from ride-hailing – which was the only driver that had quit the platform – and 3 drivers reported that driving ride-hailing was around half of their income. All of the drivers except for one, had driven on a ride-hailing platform for over a year, we present an overview of drivers' earnings and other data in Table 4.1. In this table, I report data that was directly captured from the survey for all fields, with the exception of *Dependency*, where I iteratively coded responses from a number of questions from surveys and the interview responses.

Table 4.1. Participants' Reported Driving Condition.

<i>Driver</i>	<i>Hours/Week</i>	<i>Months Driven</i>	<i>Earnings/Week</i>	<i>Income (Driving%)</i>	<i>Dependency</i>
Jay (D21)	5-10	30	<\$100	60-80k (<=10%)	Low
Mike	12	36	<\$100	<40k (2%)	Low
Linda	12	12	<\$100	<40k (2%)	Low
Scott (D3)	20-25	12	\$500-1000	Unknown (<=20%)	Low
Kathy (D25)	20-40	25	\$500-1000	>80k (<=20%)	Low
Jack (D5)	20-40	6-12	\$100-500	40-60k (<=20%)	Medium
Alex (D49)	20-40	18	\$100-500	20-40k (50%)	Medium
Bob (D50)	50	27	\$100-500	40-60k (50%)	High
Billy (D24)	50	31	\$500-1000	<40k (50%)	High
Mary (D32)	50-80	36(quit)	>\$1000	60-80k (100%)	High

4.2.1 What does being 'Part-Time' mean to drivers?

In the sample, around 83% of drivers (44/53) reported working part-time (i.e. less than 40 hours for an average week on ride-hailing platforms). I wanted to

understand why this was happening and what being part-time meant to these drivers. One aspect of working part-time means that they often have a different full-time or several other part-time jobs aside from being a ride-hailing driver. For instance, most of the interviewed drivers reported

“I have a nine to five job.” – Jack

“I owned a sandwich shop... I was looking for part time opportunities to bridge the gap in between while I prepare opening a new shop” – Billy

Among these responses, one of the interviewed driver Bob reported that other than driving Uber and Lyft:

“I am a full time caregiver for a developmentally disabled person, hired by the state... I am also a photographer on the side” – Bob

This was particularly interesting, as drivers like Bob viewed themselves as part-time even when they were working more than 40 hours per week. As he puts it

“it [driving] can’t be my only income ... because Green Bay has 100k people in population, the market constraint make it impossible to make a living driving Uber and Lyft.” – Bob

From these results, I realized that some drivers are working multiple part-time gigs while fitting ride-hailing within a constellation of different gigs.

On the other hand, among participants, ride-hailing part-time seemed not just be about working fewer hours, but instead was a combination of factors that included their financial status, other jobs they had, and how aspects of their life fit around being a driver. As I further investigated and analyzed data, I came to see the number of hours worked, amount of weekly earnings, and the percentage of income that the driver earns from ride-hailing, as features – albeit extremely important ones – that indicated how drivers were structuring their relationship with the platform, but were not in and of themselves sufficiently representative of the lens through which drivers viewed or structured their own work.

I feel that this phenomenon is more accurately expressed as drivers’ level of *dependence* on ride-hailing, which was firmly rooted in 1) how risky the driver felt that ride-hailing was (mainly in terms of financial risk) and 2) how much risk they were willing to expose themselves to. Whether or not drivers considered themselves part-time or not, was more about how dependent they were on their ride-hailing income. Furthermore, just because they worked part-time on a platform like Uber, did not mean they were not full-time gig-worker in sum total. The reasons that these full-time gig-workers were part-time ride-sharers, were related to the same determinations around level of risks and uncertainties that they could tolerate. The nature of the ride-hailing platforms and the structure of working on these

platforms, enables and perhaps encourages drivers to self-select from various risks and to work part-time.

This can be seen in one couple we interviewed, Linda and Mike, who both deliver food for a local restaurant as their full-time job, and do ride-hailing on Uber/Lyft on the weekday evenings and some weekends. Linda and Mike each reported that their yearly income was each less than \$20,000 and that they did not have significant amount of income coming from ride-hailing. While driving ride-hailing only took up a small fraction of their total income (“2%” – Mike), they still considered that it was “worth it” to do ride-hailing so that they could earn extra pocket money. However, according to Mike, even if he was relatively satisfied with ride-hailing as a good side-gig, he would not give up the food delivery job and increase hours in driving, as he explained:

“It’s [restaurant delivery] a lot more consistent, because it’s an actual job. I don’t have to sit there and wait for somebody to call me.” – Mike

For Linda and Mike, ride-hailing is too risky for a full-time commitment, which would expose them to higher levels of financial risk. Therefore, without carefully assessing a ride-hailing platform for users like Linda and Mike, it would be difficult to sufficiently capture their experience on the platform. That is, they are happy with the platform for what it is, but they also feel a level of uncertainty and risk in using the platform. In this case, the design and philosophy behind the platform seemed to nudge them into part-time work.

There was also a considerable portion (33%) of the drivers who worked fewer hours (i.e. less than 40), and were fairly dependent on their ride-hailing income which served as a *safety net* that helped them to cover additional or unexpected expenses (similar to other gig platforms [Martin et al., 2014]). For instance, these drivers reported the reason for driving was to payoff debt (D42) or having a temporary gig while they are switching jobs (D45, D7). In these drivers’ case, while they are part-time in terms of hours worked, their level of financial dependency was fairly high and their experience on the platform was demonstrably different than someone like Linda and Mike. That is, these part-time drivers had more in common with the drivers working full-time hours, for example one driver (D10) reported driving more than 50 hours per week noted that they felt as if they were being forced into working on the platform, “*I have no choice, I have a car loan.*” This was similar to Bob (D50), who reported working what would be considered part-time hours 20, but felt that they were forced to work to payoff lawyer bills, or D43, who was having trouble keeping up with medical bills. These drivers, regardless of hours worked, will have a demonstrably different experience and set of needs when compared to drivers who were not as dependent on their income from ride-hailing.

At the most extreme end of the spectrum, one participant Mary, illustrates the type of risks and precarious positions that drivers take on when they do decide

to fully depend on their ride-hailing income. From the 53 surveyed drivers, Mary (D32) is one of the 9 drivers who drive more than 40 hours per week, she was also an early adopter of ride-hailing in a large city and reported the highest ride-hailing weekly income among all participants. That said, she was also the only driver who had completely quit the platform. Mary experienced the boom time of ride-hailing, and structured her life in a way that exposed her to a lot of risk that depended on the whims of the platform, according to her:

“it’s not worth it to do it full time. I do hear if you have a great full time job, if you’re making fifty, sixty thousand a year and you come out ‘I made an extra three hundred,’ that’s great for the part-timers but for somebody like me [a full-timer], it’s no longer lucrative. To do it full time, you can’t sustain a household through full time, they are pretty much impossible.” – Mary

Part of the reason it was no longer lucrative for Mary, were the changes in how ride-hailing companies had incentivized drivers early on to get them to use the app, but as more drivers adopted the platform the fares began to drop below sustainable levels. Mary clearly felt let down by the ride-hailing company, as she put it:

“ [driving ride-hailing] went from being pushed from the beginning where you could make it a career to just saying oh no it was just a gig.” – Mary

For drivers that were more financially dependent on ride-hailing income, the pressure of *trying to make it work* seemed to take a toll on them. This is an important consideration in evaluating the efficacy and usability of these platforms. For instance, Bob – who considers ride-hailing as an integral source of his income, he said that it *“could not be a primary income, [because] there are not enough of [rides] in a day to drive to make it primary income”* and he still holds a more stable full-time job. That said, Bob was one of the participants who was more financially dependent on his ride-hailing income than others, telling us that *“hopefully in three years, I’ll be debt free [through driving ride-hailing]”*. This dependency structured Bob’s interactions on the platform and with others:

“I’ve had riders that tell me it’s obviously because of my poor life decisions that I have to drive Uber to make money, and I don’t think I’ve ever been treated that badly by anyone else in any facet of my life. I’ve never been looked down upon as much as I am when I’m driving Uber or Lyft.” – Bob

When interaction with riders start to go poorly, Bob felt the need to *“shut up”* to avoid any consequences in his rating, because he needed this income to sustain his financial needs.

On the other end of the spectrum, Scott – for whom ride-hailing income was mostly optional – responded to similar situations quite differently, even though he was also working a fair number of hours (20-25), he reported defending himself during a negative interactions with riders because, “I don’t put too much weight on [ratings].” He described a specific incident to us:

“ it was before the presidential election last year I picked up some international students. They were all drunk and they were asking me who I was voting for president. They didn’t like my answer, they began to berate me and that was when I pulled over and I hit the brakes and I said ‘not in my car, you’re not going to call me names and berate me’, I said ‘you asked me the question I gave you my answer, rides over’.”
– Scott

In this subsection I have described how drivers were framing their relationship with the ride-hailing platforms, drivers attitudes and interactions seemed to be more rooted in their financial dependence. That said, a large impact of this dependency was in the number of hours worked, in the following subsection I examine how drivers’ financial dependency had material impacts with their attitudes and interactions on the ride-hailing platform.

4.2.2 How does financial dependency impact drivers’ view of the platform

Drivers’ attitude towards ride-hailing platforms was heavily impacted by their level of financial dependency on ride-hailing. For example, some drivers like Mike and Linda (who we introduced earlier) did not have as large a household income as some other participants, but they only did ride-hailing to supplement the income from their full time day job. Reflecting on driving for Uber, Mike was more positive than not, particularly in comparison with his father’s experience driving taxi:

“The taxi business is just terrible [...] taxis used to earn a lot of money, no market competition and because of that taxi companies had so many hierarchy, very strict regulations, so many bills taxi drivers had to pay. The whole system was designed to make a lot of money from everyone, whereas now with Uber its a lot more free market competition. In long term there’s going to be an equilibrium number of Uber drivers and Uber customers and [the college town] is getting there right now. Right now in [this market] with Uber it’s a fair market. If you go to Buffalo NY, where there’s no Uber, it’s all taxis, it’s an unfair market, because the taxi companies there are monopoly, so they can charge you anything”.
– Mike

In this case, I am certainly not suggesting whether taxi or ride-hailing is better rather to present Mike’s perspective.

However, drivers who worked longer hours and were more dependent on their ride-hailing earnings were not as optimistic as Mike and Linda, for instance one driver, who was on the completely different side of the spectrum reported working 90 hours per week and was quite unhappy and negative about the platform:

“They can expect to hear from my lawyer, I don’t want [anything] from these scumbags but for the government to shut them down.” – D48.

Drivers’ dependency on the platform seemed to be a primary predictor of how drivers viewed the platform. That is, drivers had very polarized responses and opinions to ride-hailing companies and their platforms, almost invariably, this corresponded with how much they felt like they ‘had’ to work on the platform. In other words, as the level of financial dependency on ride-hailing work increased, their satisfaction with working on the platform decreased as they felt more affected by the negative aspects of and difficulties on the platform. It is worth pointing out again that in the entire sample, around 20% of drivers received their entire income from ride-hailing and considered it their full-time job (which corroborates with Uber’s own studies [Hall and Krueger, 2018] and Uber’s own claims¹).

When directly collate the level of dependency that drivers have on their ride-hailing income to their levels of satisfaction expressed during the interviews, I see a clear trend. For instance, Scott is a retired police officer who receives the majority of his income from a pension that *“will sustain my wife and I until we leave the earth”*. For him, who drives ride-hailing in a small college town in the northeast region of the United States – driving was more *“a matter of keeping busy, its play money, its vacation money”*. Realizing some amount of risks in the platform, Scott was overall satisfied and felt positive about being a ride-hailing driver:

“Yes there are certain parts of the business that are frustrating, but overall it’s a great fit for me and it’s a great retirement job.” – Scott

In fact, ride-hailing fits well enough in Scott’s lifestyle that his wife also drives (although we were not able to interview her in this study). A lot of why Scott was satisfied driving ride-hailing cars, seemed to be that it was completely optional in that he has the freedom to work whenever he wants – or not. In this way, he was able to work under the conditions that he found favorable,

*“generally I knock off and go home before anyone starts getting all drunk because I don’t wanna deal with drunkers. I don’t want to have people vomiting in my car, same with my wife [who also drives ride-hailing].”
– Scott*

¹<https://www.uber.com/info/how-much-do-drivers-with-uber-make/>

While it may be generally true that someone who depends less on an income is more satisfied with a job, it is doubly so for ride-hailing drivers as they can come and go as they please. This is particularly important for an on-demand, gig job like ride-hailing, because much of the frustration of doing such a job is around finding quality jobs [Rosenblat and Stark, 2016].

It seemed to me that the warts of using a ride-hailing platform were much easier to overlook when the drivers had a relatively stable household income and were less financially dependent on the platform, because using the platform was less important to them. As presented, Scott had a pension that was enough to sustain his household, Kathy has a full time job that covers her regular daily expenses, and Linda and Mike only drove for a less consequential income supplement. For these participants, driving gives them the freedom to work extra hours whenever they can and want and if is not going well one night, they can just go home. However, in Mary and Bob’s case, who both have a much higher financial dependency on ride-hailing platforms, they are more impacted by the uncertainties of working on the platforms. In their case, part of having these risks meant that they were working longer hours on the platform to make working on the platform work for them.

Reviewing the survey results confirmed this finding, in that when I asked drivers how optimistic they were that ride-hailing could be a long-term career, 22/53 respondents were neutral, and 15 were positive and 16 were negative. This was essentially a mirror of the level of financial dependency drivers had with the platform. Drivers who were more positive, overwhelmingly reported primary reason for driving being for flexible schedule and earning supplemental income, which indicates less attachment and financial dependency to the platform.

Clearly, when evaluating these platforms designers and developers need to take into account the difficulties in *having* to use the platform under pressure, instead of using it when it is convenient and there are a lot of rides. These two different types of users have very different needs from the platform. As such, in the next section, I discuss some of the material interactions that were structured by these different levels of financial dependency.

4.2.3 How does financial dependency structure the drivers’ interactions

In previous research, researchers have reported that ride-hailing drivers are not always sent reasonable pick up distance for drivers and that this is problematic to them [Rosenblat, 2018]. I found the situation is slightly more nuanced, in that drivers responded differently given their level of financial dependency. For example, Kathy is a mother whose full time job covers bills and extra expenses, and for her ride-hailing is strictly a way of saving money for her son’s college. Kathy drives 20 - 40 hours per week and reported household income of over \$80,000 per year,

she “[drives] for extra money with the freedom to work when I want to.” For her, driving was a somewhat profitable adventure (“really what I make isn’t so great when all that [car depreciation, expenses] needs to be taken into consideration”), where she might take a trip assignment which other drivers might not want. The unknown of where the next trip would take her, was actually an attractive part of the gig, because for her, the income was not as critical to her.

“[I] ended up going to New Jersey, that was a \$250 trip for me, where if I did what some other drivers might’ve done, I would’ve turned down the trip.” – Kathy

In Bob’s case – who was more immediately dependent on the income –, his reaction was different when faced with a similar situation, as he was more concerned with optimizing his earnings:

“I got sent out from where I was in downtown at the moment, it was 25 minutes away, ... I wasted my entire hour during bar time.” – Bob

Part of these different frustrations were rooted in the flexibility that is required to consider driving on the platform a success. For instance, from an earlier quote, we introduced Billy who was a small business owner who drives ride-hailing car (over 40 hours/week) during his transition to the next business. Billy’s wife is a school teacher and he reported that driving ride-hailing cars provides half of his household income, but his family could cover expenses without his income. Billy told us that:

“Typically I’ll turn my app on while I’m at home, and I’ll work around my house, hang around, if I get a ride [request], I go get a ride, and then you know if it’s in [the college town] I could be gone for who knows three hours, so it’s pretty casual for me.” – Billy

Similar to Billy, other drivers who were not as financially dependent on the income reported that they drove on weekends and weekdays during “bar hours”, because those were the only times that were worth it for them. For instance, Alex, who is enrolled as a full time student, explained that

“you think like who is going to need Uber services? People that are going out drinking and don’t want to drive home.” – Alex

That said, few of the participants in the interview had this level of flexibility. This is one of the structures to the platforms interactions that is better captured as financial dependency and less in hours worked. Most of drivers I interviewed had other full-time or significant commitments and could only drive during a designated time, which was considered by drivers as “not efficient”. This is highlighted by Billy’s explanation of when he decided to go home:

“My benchmark is twenty dollars an hour, if I’m making less than twenty dollars an hour, I’m going home.” – Billy

Comparing Billy’s experience with drivers like Bob or Mary, we can clearly see that the more flexible a driver is to the rhythms of the platform and its market, the more likely they are able to avoid difficulties associated with the down times on the platform. This has material and concrete implications for how the different users make use of the platform, in that if there were no good rides available, some drivers would simply go home, while others would try doubly as hard to find the rides that they needed. These two uses need clearly different types of interactions, on the one hand, some drivers need tools that help them determine if it is worth it to drive at the moment, while others need tools to help them find opportunities regardless of market conditions. This again points to a critical requirement when evaluating these platforms, and that is to evaluate with individuals with varying levels of financial dependency on the platform.

These different strategies and reactions can be seen in the level of nomadic activity that drivers undertook to deal with market saturation. Some drivers, like Jay who had originally quit driving due to market saturation, restarted after having moved to a new city – he noted that driving ride-hailing was not the primary reason that he moved, *“I stopped driving for a little bit because [Harrisburg] was extremely over saturated.”* But, after moving to a new city he had *“signed up randomly one day because I was like hey why not.”*

For drivers that were more dependent on their income, market saturation meant that drivers needed to work to find good markets and figure out how and when to access them. For the drivers we interviewed that did not live within a relatively consistent, healthy market, they develop a more nomadic strategy to deal with the market uncertainties and rhythms. For instance, Bob talked about strategizing for specific events:

“I primarily drive in Green Bay during weekdays ... and travel to Madison, two and half hours away on the weekends...two weeks ago, I was in Minneapolis for the SuperBowl.”

However, this nomadic strategy was not completely associated with financial dependence, Kathy, who enjoyed that *“you never know where you’ll end up... I always like the adventure,”* employed this strategy in her spare time.

“I do drive in [various cities within 3-4 hours’ drive from where I am]. However there’s more money to be made to drive in other places. Like Saturday for example I got up Saturday morning, I came home from Friday night driving for Uber, short after got up and drove down to Philadelphia for the day. And drove down there all day cause there’s more money to be made than there is up here. Over the summer I was driving down to Ocean City Maryland, staying for the weekday. And

then driving down there because there's more money to be made in the beach town.” – Kathy

Certainly drivers' financial dependency is not the sole explanation of how satisfied or frustrated a particular driver might find driving for and using a ride-hailing platform. However, the manner in which interactions were structured by the context of financial dependency, went a long way in explaining why a particular driver felt about or behaved a particular way. At times, the manner in which drivers' experienced the platform and the tools that they were provided by the platform, almost seemed to nudge them towards – whether on purpose or not – working part-time.

4.3 Limitations for Study 2

In discussing drivers' dependencies on the platform, I have considered a constant state of dependency of drivers mainly around their ability in avoiding the negative consequences of platform designs and how easy it is for a driver to replace the ride-hailing income. I have not tapped into how drivers' varying state of dependency when they switch from a high dependency to a low dependency situation, how do they adapt their work practice due to the changes. Another limitation of this study was in the somewhat limited number of markets and drivers that I interrogated, as I realized later that market conditions are another factor that affect drivers' experience. Since I only focused on limited numbers of the ride-hailing market in U.S., I decided not to make claims on this particular subject. Further work needs to be done to study the various types of communities and how their different characteristics contribute to the varied experience of drivers. In the future, I also see an opportunity for studying other types of gig-economies and their relationships with different types of communities.

Study 3: Unpack Sharing through Carpool

5.1 Method for Study 3

In this study, I focused on two carpooling groups one composed of professionals and the other of college students who drive and take rides with someone who shares a similar departure and destination.

The *office* carpool group is comprised of about 60 professionals, primarily around a WhatsApp chat room. These members arrange rides from this chat room while also using third party apps, described in more detail in the *Findings*. This group is an example of a successful and motivated carpool group in the San Francisco Bay Area, and while this group may be unique and exceptional, I find it an interesting and specific real world instantiation of an exchange that is experiencing some of the idealized benefits of the sharing economy.

The *student* carpool group are formed from three U.S. campuses in different areas of the US – two in the west-coast and one in the north-east region – which used Facebook ride-sharing groups. These campuses provide a relatively successful example of student carpools, with a different rhythm of interaction. There are 21,001, 13,493 and 2,113 members in each of these student carpool communities respectively. Note that similar student carpool groups exist beyond these three that I studied and may have different practices, tools, and habits. In both cases with professionals and students, I am not making a claim that these findings are generalizable, simply that they provide an example or proof-of-concept for groups that enact sharing exchanges.

I gathered the data while participating as a member in both student and office carpools at various times during this research and conducted a total of 17 semi-structured interviews. From March to December of 2019, I observed, posted ride requests, and offered to share rides in one of the sub-communities of the student

carpool Facebook group – completing a total of 6 trips, 5 trips as driver and 1 trip as rider. I gained verbal consent from participants while conducting these rides. For interviews, I recruited total of 10 participants from the student carpool group – 4 were drivers, 5 were riders and 1 was the administrator of the Facebook groups – that are associated with three different U.S. public universities. From May to August of 2019, I also participated as a rider of the office carpool community, during which a total of 36 rides were taken with different drivers and riders. For the interviews from the office group, I recruited 7 office participants – 2 drivers, 2 were both drivers and riders, and 3 riders – all participants had at least one carpool encounter with the author, and I also gained verbal consent from participants while conducting these rides.

The semi-structured interviews were conducted through a mix of in person, video, and phone conversations. The interviews lasted from 20 - 45 minutes and I compensated each of the interviewees \$10 in cash or through online payments.

All interviews were audio recorded, which were then transcribed by hand. The observations were gathered in notes and complemented the interview transcripts. Similarly to previous analysis, I iteratively coded these data through a process of open coding, axial coding, and memos. During this process, I sat down in meetings twice a week with my advisor to discuss the appropriateness of the different themes. To protect drivers' identity, I use gender and culture specific pseudonyms and their affiliation (e.g., office, driver; student, rider etc.) to refer to them and their comments to maintain a more nuanced presentation and retain the context of the individual.

5.2 How is Carpool a Sharing Activity Compared to Ride-hailing?

There were two key differences between the carpooling groups that I observed and ride-hailing services like Uber or Lyft. First, the members of the carpooling groups had shared needs and goals – e.g., they were both travelling from roughly the same starting place to roughly the same destination – whereas in ride-hailing the driver and rider had complementary needs and goals – e.g., the rider needed to get from a starting point to a destination which the driver was willing to facilitate for a fee but otherwise the driver had no need to be at either place. The former is clearly more akin to what was aspired in the original promise of sharing economy [Botsman, 2013], partly because they *share* a need, whereas the latter is more transactional. The second key difference, which was somewhat of a result of the shared need, was that the members of the different carpooling groups had similar backgrounds that provided common ground for them to relate to each other on an equal level. This is somewhat in contrast with ride-hailing, where the driver is considered to be providing a service for the rider, which creates a very different

<i>Office</i>	<i>Occupation*</i>	<i>Role</i>	<i>Students</i>	<i>Affiliation</i>	<i>Role</i>
Ming	Accountant	driver	Nate	Self-employed	group admin
Jason	Engineer	driver/rider	Martha	UCB	driver
Ken	Engineer	driver/rider	Aman	UCB	driver
Ying	Engineer	rider	Steve	UCB	driver
Will	Engineer	rider	Julie	UCB	rider
Pali	Product Manager	rider	Ada	UCSC	rider
Sam	Financial Analyst	rider	Sandeep	PSU	rider
			Mustafa	PSU	rider
			Dana	PSU	rider

Table 5.1. Participant details. Among the 17 interviewees, all professionals work in tech-industry, instead of naming the company names, I provide their occupation to present their common professional background. All students, except Nate who is the administrator of Facebook carpool groups, are from the universities in their abbreviations (University of California - Berkeley, University of California - Santa Cruz, Pennsylvania State University). I present students affiliation to support their shared background in university affiliation. The participants sampling of these universities are representative of their carpool group sizes.

power dynamic, especially when coupled with the role that the ride-hailing income plays in the driver’s life.

This builds on the work of Belotti et al. [Bellotti et al., 2015], in that both of these needs were *instrumental*, going beyond this categorization however is whether or not these needs are *common* or *complementary*. This difference seems to have had significant impacts on how the service or exchange is structured and the relationships that are formed during enacting this service. In the remainder of this section I unpack the impacts of this difference and contrast this with ride-sharing services.

When presenting the quotes from participants, I give two different sets of labels to clarify which community they are from (*office commuter* vs. *student*) and their role in the carpool (*driver* vs. *rider*). In terms of role, there is one exceptional case where some drivers and riders played both roles at different times, in this case I label them as *driver/rider*. This exceptional case speaks to the more equal coproduction involved in enacting a carpooling ride vs. a ride-hailing one.

In Table 5.1, I present the list of people I interviewed in pseudonyms, their occupation for professionals and affiliation for students, and their roles in the carpool.

5.2.1 How are people arranging carpools?

Between the two carpool groups, the office carpool and student carpool themselves are different, even though the members within their respective groups share the same needs and goals with other members. This difference is primarily based on the particular needs of each group, i.e. the office carpool group arranges rides around a daily commute, therefore members need a ride everyday at the same time to the same place and once the carpool is arranged it is semi-fixed in terms of who is riding with whom. On the other hand, the student carpool group arranges rides around going home (and later returning to campus) for school holidays, these rides are longer and more exceptional in nature, therefore these rides are mostly one-off arrangements and most of these rides are taken with a student who they do not know beforehand. In the below two subsections, I present how rides are carried out by the two groups, particularly in regards to technology.

5.2.1.1 The office carpool group

In the office carpooling group, at first glance there is a striking similarity with ride-hailing platforms. This is seen when referring to Figure 5.1, where the driver is using multiple apps to maximize earnings. Office commuters were carpooling for similar reasons to ride-hailers, e.g., they regarded public transportation as inconvenient and difficult, and that when driving your own car finding parking was hard and they were not able to use high occupancy lanes, which adds more time to the commute. The manner in which office carpoolers arranged rides was a mix of two carpooling apps (Waze Carpool and Scoop), WhatsApp groups, personal references and networking. While these different forms of technology supported various aspects of arranging carpools, they were primarily used as an augmentation that leveraged the networks carpoolers had already developed:

“Riders know each other. Through Will, I know Ken, through [Rider A’s name] I know [Rider B’s name]. I found [Rider A’s name] on Waze, and through them I know more people” – Ming (office, driver)

However, this is not always the case and for several of the office commuters that were interviewed, their first carpools were found through Waze Carpool or Scoop. That said, once they did connect with a driver, they would ask about available spots in later carpools in person. Other times, riders joined WhatsApp groups and would ask around for available spots. Between the two apps, Waze Carpool seemed to be more popular than Scoop, this seemed to be because of the restrictions that Scoop imposed on the practice (restrictions which seemed similar to the ones that ride-hailing drivers complain about [Ma et al., 2018]):

“[Scoop] is a lottery system, you can’t choose rider, system assigns you a random person. [...] For morning rides, you need to sign up by

the previous evening 9pm, for afternoon rides you need to sign up by 3pm [...] Scoop will penalize rejection if you do it last minute.” Jason (office, driver)

As opposed to Scoop, Waze showed a list of carpoolers who are going to a similar destination at the user’s specified time and leave it up to the user to share or ask for a ride with whomever they choose, which allowed carpoolers some flexibility in making arrangements inside or outside of the app, and reflect both types of arrangements within the app. For Jason, it’s not that he often needed to cancel rides the last minute, but the level of flexibility and his ability to maneuver when arranging rides is what keeps him on Waze Carpool instead of Scoop.

An additional notable reason for carpoolers to stay on Waze is that the app provides subsidies and promotions that attracts carpoolers, some of these subsidies were provided by carpoolers’ employers. For instance, for the first few rides the app charges riders an introductory rate of \$2 and later the standard rate of \$5, which is still cheaper than public transit. At the same time, the app paid drivers \$11 for the first rider in the car, and \$7 for each subsequent rider (it is worth noting that without companies subsidizing these rides, the app would operate at a loss at these prices). In order to maximize earnings, some drivers used multiple accounts, so that if there are 3 riders in the car, the driver can earn the \$11 fee for each of the riders. In the Figure 5.1, Jason has three different devices turned on while giving rides. This makes it clear, that at least in some cases, money is enough of a motivation to keep using the app and to go to the trouble of configuring and using three devices.

This was not true for all drivers, for example, for drivers like Ming, the Waze Carpool app only played a supportive role when recruiting riders. In Ming’s case, most of the riders are either regular riders, or ones that he connected with through their personal networks. A common practice is that once a rider is in the car, if a driver has open spots, they would ask if they need a ride for tomorrow or the rest of the week. This means that drivers form a consistent stable of riders and that they might have the same 3 riders for months until someone drops off. The time when a carpool driver needs to find rider is rare (which is obviously quite different than ride-hailing drivers):

“[driver name] is very consistent compared to myself. He needs to take 2 passengers, 3 is ideal. Having consistent rider is also the key. [A rider] and his wife is [the driver]’s consistent rider, the rest spots belongs to some lucky guy or lucky lady when he has an empty spot.” – Ken (office, driver/rider)

When one of the regular riders cannot make the ride on a given day, these ‘consistent’ drivers would send a message in the WhatsApp group, that someone else created, to see if there are any takers of the empty spot. However, this is not



Figure 5.1. An office carpool driver's interior is strikingly similar to an Uber driver

a regular occurrence, and during the 3 months of this field study, I was only aware of it happening twice.

“If you cannot commit to a fixed schedule, more days of the week, then it’s tough for you. It’s hard for people to stick with you. Riders don’t want to keep looking for new driver.” – Ming (office, driver)

Not all drivers have such a consistent and regular schedule for their carpool, in Jason’s case, he only drives two or three days a week depending on parking and where he is working that day, this obviously reduces his ability to maintain a consistent set of riders. As a result, he often has different riders from day to day,

however, these riders still have some amount of stability as they are drawn from a larger pool of semi-regular riders.

There are also drivers who do not use either Waze Carpool or Scoop, as they prefer to set their own price (e.g., \$8 one way), and ask riders to pay through PayPal. For riders, this is slightly more expensive than public transit, but because the carpool saves time, it is acceptable for some riders.

5.2.1.2 The student carpool group

The student carpool group is primarily mediated through a number of Facebook groups, where students post their traveling schedules and whether they are looking for a ride or riders. Starting first with my university's student carpool group, I was able to find several popular student carpool groups, all of which are managed on Facebook by a carpool start up. According to Nate – one of the administrators of the carpool groups who I interviewed, they are managing around 80 such Facebook carpooling groups across major U.S. based university campuses, each of which host from 600 to over 20,000 members. Members of these carpool groups are overwhelmingly students, alumni and affiliates of universities. The peak time of traveling is during long weekends, major holidays, and the beginning and end of the semesters. In other words, many carpoolers in the student carpool groups are not frequent or regular travelers. The trips carried out among members are mostly medium to long distance which take anywhere from 45 minutes to 8 hours.

In the student carpool groups, depending on the size of the Facebook group, and if you are travelling during a common time during the semester, it may be more or less likely to find a match. As such, students put more effort and planning into finding and arranging their individual rides, than the office commuters, sometimes arranging weeks in advance of the ride:

“I have been able to find a ride when it's towards a long weekend or the end of the semester, but if I post something on the third weekend of the semester, there's nothing going on, during that time, I would never find anything. ... I would usually post one or two weeks prior, you have to post 3 or 4 times leading up to the date.” – Sandeep (student, rider)

Other than scheduling, traveling destinations also needs to be taken into consideration for both drivers and riders. When departing to or from a more rural location, the riders need to consider traveling to a larger city to meet the driver.

“I had to meet the driver at [city name] which is 40 minutes away from where I live.” – Dana (student, rider)

Similarly, depending on their destination, some drivers won't drop riders at their exact destination, and must find other ways to get there.

“I normally try to get a ride anywhere close enough, get dropped off in a common area like an airport, then either my mom or another relative come pick me up.” – Julie (student, rider)

This is because the drivers are not seen to be providing a service, instead riders are seen to be sharing gas expenses and to provide company when going on long trips. As such, most of these carpools charge a price based on informal negotiations.

“The driver didn’t ask for money, but I gave him \$20, which is about half tank of gas.” – Dana (student, rider)

“A rider once only had \$10 on her and after the ride she offered to pay more via Venmo, I told her that you don’t have to pay the extra, but I’d prefer if you do.” – Aman (student, driver)

5.2.2 Shared needs and backgrounds

The context within which a peer-to-peer exchange is enacted, impacts many details in how it is enacted. This is particularly true for exchanges of a regular or longer duration, which require a greater financial investment, or involve more social interaction and this impacts the participants’ sense of trust in one another [Mittendorf et al., 2019]. This dynamic was at the root of carpooling, in that both participants in the exchange have shared interests from the outset, and they both have responsibilities in successfully enacting, or coproducing, the ride.

This dynamic does not exist in the same way for popular ride-hailing platforms, where drivers are providing a service to a rider in exchange for money [Lee et al., 2015]. The ride-hailing exchange between a driver and rider is often a short, one-time transaction that requires a high level of financial investment and risk from the driver, but not so much from the rider [Rosenblat and Stark, 2016] which creates unequal stakes and risks in the coproduction of that ride [Ma et al., 2018, Kameswaran et al., 2018], which creates a highly imbalanced power relationship [Hanrahan et al., 2017, Rosenblat and Stark, 2016, Rosenblat, 2018].

Carpooling is in stark contrast to this imbalance, in that the drivers and riders have much the same need and social position, drivers are trying to access the carpool lanes, subsidize gas and parking expenses, as well as finding someone to talk to during the ride.

“We are all broke students, we are just trying to get to places together, so treat me just like you treat someone else, instead of a driver.” – Martha (student, driver)

This is mostly the same set of reasons that riders are looking for rides, they want a faster, cheaper way than public transit or ride-hailing to get to work.

“I feel more comfortable [carpooling] than going in Uber because I know that they are here for education, you’re here for education whereas, you don’t know the Uber driver’s background.” – Sandeep (student, rider)

In the case of carpooling, being the driver and owning a car can even be a position of power, as the driver is seen to be managing the carpool and choosing riders at times.

In carpooling groups, riders are able to rely on drivers to show up at the scheduled time and spot because they live in the same neighborhood and are motivated to get to the destination, this is particularly the case for the office commuters, as they share a similar work schedule and location. The initial interactions with drivers or other riders, rely on this shared goal and need to get to work. For instance, Pali shared one of her previous carpool arrangements.

“I used to do carpool with one of my coworkers, we would alternate to drive on different days.” – Pali (office, driver/rider)

This fluidity of roles, where one day you are a rider and one day you are a driver, shows the more equal coproduction of the ride, as well as the shared goals and backgrounds in a concrete way in carpooling that really does not exist in ride-hailing. Another side effect of having a shared background between carpoolers was more natural for and expected of them to trust each other and treat each other as equals. This is reflected in the decision of whether or not to join or take a carpool, particularly among student drivers and riders when interacting during the carpool. For instance, even when common wisdom is to ‘never get into a stranger’s car’, student carpoolers like Sandeep often feel safe to go on an hours-long trips with several other carpoolers because of a shared background.

“You can see the person’s profile on Facebook, they are all going to the same school.” – Sandeep (student, rider)

From my own experience carpooling and interviewing several carpoolers, I learned that it’s a common practice to confirm others’ identity using Facebook profiles.

5.2.3 Impact on riding etiquette

Having a shared background, needs, and goals affected the manner in which carpoolers treated each other and the dynamic of how they interacted during the carpool. For example, Ada suggested various things that she kept in mind while carpooling. For instance, when asked what would be some advice she would give to a new carpooler, Ada had several suggestions:

“Be respectful, don’t leave trash in someone’s car. Try not to make changes last minute. [...] Be honest. If you agreed \$8 in the post, when

you're in the car don't try to hack and be like 'oh I only have \$7 or \$6 on me', that's kind of rude." – Ada (student, rider)

This is not to say that all riders are always on their best behavior when carpooling, but this attitude of appreciation and mutual respect for someone's space is common. For instance, while I participated as driver in the student group, occasionally, I have received unprompted 'thank you' messages from riders after the ride. I heard similar stories from participants.

"I've had several people texted me and said 'thank you' after the ride, which I'm pretty happy about." – Adil (student, driver)

Such a dynamic between drivers and riders draws a contrast with ride-sharing, where it's common that riders leave an Uber trip without much emotional attachment about the trip or the driver, at the same time, Uber drivers were found providing water bottles, opening car door and other emotional labor to gain rider's appreciation for better ratings [Raval and Dourish, 2016].

In addition to the activities engaged in scheduling and arranging rides, carpoolers are forced to spend a certain amount of time in the space that's bounded by the trips. From the experience of being a carpool member, the authors found a mix of social and non-social moments during carpools. Part of being a good rider is to navigate these moments, this experience was echoed by the participants I interviewed. For example, Sam often initiates conversations in a carpool and he is genuinely interested in listening to people's stories and carrying on a discussion. At the same time, as much as he likes to engage in conversations and getting to know people, Sam also suggested that:

"I can sense that if the other person isn't interested or are busy, or if they are just not ready to open up, then I wouldn't force it." – Sam (office, rider)

Towards the end, Sam concluded his strategy of when and how to engage during a carpool:

"Everyone is not the same, in the carpool you have to engage if the other people are social, if they want to talk or if they don't want to be bothered." – Sam (office, rider)

While managing riders' preferences for conversation is a relatively common practice for ride-hailing drivers [Raval and Dourish, 2016], in the case of carpooling this was also a common practice for riders. Ying for example, kept track of when a drivers' preference interferes with hers, and expressed her willingness to make adjustments, this practice illustrates the more equal responsibilities that the parties felt in enacting this coproduction.

“I would respect drivers’ preference while in the car. For example, [a driver] doesn’t talk a lot, I would mainly work on my own things during the trip; Jason is more talkative, I’m happy to join the discussion most of the time; Ken likes to listen to the radio, but sometimes I have work to do, then I’ll wear an ear plug... I’m very respectful of what drivers want.” – Ying (office, rider)

This level of understanding from riders extends to more unpleasant situations at times, according to Ken who does a mixed of driving and taking rides:

“Once my tire exploded on the highway, I had to drive off the highway and wait for roadside assistance [...] The rider was super patient and talked to me the entire time while we were waiting, he was understanding of the situation [...] it was an unfortunate situation, but the result was good. The rider actually told me that he never had a tire exploded before and he learned something new. It made me feel people are very generous and understanding.” – Ken (office, driver/rider)

While Ken acknowledged that these types of situations do not happen very often, he noted that it’s uncommon for riders to get angry in this situation. After all, he said that he is *“not a taxi driver, we are just each other’s company to commute between home and work.”* This sentiment is also shared in the student groups:

“I am not your driver, we are all students and this is the optimal way, it’s not a business transaction.” – Aman (student, driver)

The fact that drivers aren’t providing a service that’s exclusively exchanging their own time and vehicle for a fare, but that they share a common destination with riders changes the dynamic of how they interact with and hold each other accountable. For riders, their expectation of the drivers’ behavior is different from what they expect for an Uber driver:

“With Uber, I expect drivers to arrive at the location ASAP as indicated on the app, open the trunk when they see me having a suitcase, understand and see if the rider doesn’t want to talk, they should just respect them and not to force a conversation and leave them alone. For carpool, my expectations are more informal. I still expect drivers to communicate. If the carpool driver says I will pick you up at this time and location, then I expect them to be there at that time. But I don’t expect carpool drivers to pick up my suitcase [...] If they don’t want to talk, it’s fine too.” – Ada (student, rider)

When asked why the more friendly expectation for carpool drivers when compared to Uber drivers, Ada explained:

“Because they are doing a nice thing for the riders, plus you want to leave a good impression to the driver too, because you could go ahead and develop a relationship that you probably don’t have to pay a lot or not pay at all, you may even become friends.” – Ada (student, driver/rider)

From the carpool etiquette to the understanding and forgiving attitude that riders showed towards drivers, it seems that carpool activities are conducted with a different set of rules, which are rooted in a more symmetrical power dynamic, particularly when compared to the asymmetrical dynamic of ride-sharing [Rosenblat and Stark, 2016].

5.2.4 Forming relationships

Both the office and student groups have developed different relationships and friendships within and beyond their trips. In particular, due to the repeated encounters, office commuters formed more long-term relationships through deeper conversations and knowledge of each other’s lives. While the structure in the student carpools does not make for repeated encounters as strongly, these rides do afford an opportunity for the parties to engage in long hours of conversation and collaboration around activities within the one trip setting. I present these activities separately from the office and student carpooling groups.

5.2.4.1 Interaction in the office group

Conversation is important to carpoolers, so much so that a common way that they refer to each other is whether or not they are a “talkative” person or not. For instance, Sam considers himself a talkative carpooler and often tries to initiate conversations:

“Initially, Ying would do her own business, but I’d then crack her up and talk, because I feel bored and I like to talk to people” – Sam (office, rider)

Particularly for the office carpoolers, the conversations they have are a large part of why they enjoy the activity and keep with a stable group.

“Jason is the mediator, he would introduce us to each other whenever there is a new rider, and I appreciate that. ... I once talked about quantum computing with Ken, which was an interesting conversation, I would also talk to [a driver’s name] about latest shows and dramas. ”
– Ying (office, rider)

These daily carpools allowed carpoolers to develop lasting relationship beyond the carpool. For instance, Ming referenced a rider he had years ago, and even though

that rider had changed employers and no longer carpooled with him, he would still call him to catch up.

During short or long carpools, drivers and riders engage in conversations which varied from small talk to deep discussions in life goals and relationship advice. The topics of the conversations are often a result of the carpoolers' background and life situations. For instance, Ming is an accountant and several carpoolers referred to him as the "finance guy" who often likes to discuss daily financial tips with riders. According to Sam:

"I've bought stocks because Ming and I talked about it, and I thought that was a good idea... I've also changed my insurance policy based on his advice." – Sam (office, rider)

Another set of conversations that evidence the respect that carpoolers have for each other, is when they get each others' advice on things like child care:

"We talk about kids ... with [a driver's name], who has two kids, he would ask me about what classes my kids would take, for example, swimming, art, dance and singing." – Pali (office, driver/rider)

For carpoolers, they also sometimes benefit from conversations even if they are not actively participating by gaining some knowledge that they might otherwise encounter. For instance, Pali is not a talkative carpooler and depending on whether she's tired or busy, she may or may not participate in conversations, but she still might learn something new.

"Even though at times when I'm not actively participating in a conversation, I heard people talk about what's happening in Singapore and China, I had no idea about these things before, and I would want to go back and look it up." – Pali (office, driver/rider)

While a shared background for both the office commuters and the students facilitated an initial formation of trust that aided forming the carpool arrangement, the regularity of the office commuting group supported the formation of deeper, stronger relationships between carpoolers. This is evident in the case of Ken, who was both a driver and a rider, when asked whether he would drop his child to Jason for a couple of hours since they live close.

"No, but not because I don't trust him, I just don't think he's good with kids, similar to some of my own families ... [on the other hand] I would lend him \$500 if he asks, because he's a reliable person and I trust him." – Ken (office, driver/rider)

In contrary, the expectations and relationship in ride-hailing are very different from what I found in the carpool groups. While consumers are now comfortable enough to hop in strangers' cars for ride-hailing platforms, their relationship rarely spans more than a single trip [Lee et al., 2015] and it would be hard to imagine a rider lending \$500 to their Uber driver.

5.2.4.2 Interactions in the student group

Compared to the office carpoolers, student carpoolers engage in conversations about their backgrounds, activities around campus, and common interests. While conversations can largely remain in the introductory and “small talk” level in the first 30 to 60 minutes of the trip (Ada, Julie), others may talk for the entire trip and become friends at the end of the trip (Adil).

For instance, for some student carpoolers,

“Undergraduate kids aren’t as inclined to exchange advice etc., they do more of small talk but don’t get into too much life situations with each other.” – Ada (student, rider)

For others,

“I once dropped off someone at [location name], we found out our common interest in cars and we talked the whole way about it. ... one day he texted me and asked if I want to go out for dinner, I said sure and we went.” – Adil (student, driver)

At times, additional activities can be necessary for some 8 hour long trips and show a level of coordination in enacting these trips.

“I’d go out and eat during the trip with riders some times, or if I’m grabbing food from somewhere, one of us will offer stay in the car to watch our belongings while we pick up food for everyone.” – Martha (student, driver)

Overall, I observed a relatively lower level of engagement in conversation and investment in the ride when comparing the student carpoolers to the office groups. Much of this can likely be attributed to the lack of repeated encounters in the student groups – most of their trips are a one time thing.

5.2.5 Limitations for Study 3

One limitation of this study was in the diversity of the carpool groups that was studied. Particularly, the professional group was uniquely based in the Silicon Valley where group members share unique common background in their location and industry of work. I look forward for later studies to inform carpool groups beyond urban, students and communities within U.S. contexts. Therefore, the findings cannot be generalized globally, instead, I present two successful cases of community carpool to say that the concept of ‘sharing’ is not to be muddled with ‘gig’ in the ride-sharing context.

I have also decided not to focus more on the logistical challenges facing student carpool groups which ride-hailing platforms have accomplished better success. As

I realized later that the student carpool groups are still growing, it may or may not self resolve the current low-matching situation in the future. Future work could also focus on an individual study conducted to improve the scheduling and match success among student carpoolers.

Chapter 6

Discussion

In this chapter, I first provide discussions for each individual studies and design recommendations from those findings. I then provide a discussion on the overall lesson learned and design direction from this dissertation. In that, I present possible future work including one on-going project that's a direct outcome from this research.

6.1 Study 1: What are Drivers' Stakes?

In this study, I have outlined two of the primary stakes that drivers on the Uber platform expect to be due to them. Simply put, these are the ability to earn a reasonable wage and to do so on their own terms with a degree of autonomy. In order to illustrate these stakes, I presented how the drivers discussed when these stakes were being breached. Looking at Uber through the lens of Stakeholder Theory helps to better enunciate the current situation as well as to outline a path forward.

6.1.1 Why stakeholder theory?

One of the primary reasons to apply Stakeholder Theory to Uber is that Uber, in a quite literal sense, implements the management of their workforce via their platform [Lee et al., 2015]. Therefore, constructing a platform such as Uber is, in many ways, a *managerial* act and it is informative and useful to draw from a managerial research tradition like Stakeholder Theory. Stakeholder Theory itself is particularly elucidating for this type of platform design as it gives us a way to talk about who, in terms of which stakeholder groups, is being considered in various managerial decisions, or in Uber's case, decisions on functionality. Since Stakeholder Theory was originally a reaction to stockholder-driven managerial decisions, we can leverage its lessons as a reaction to profit-driven design decisions.

More specifically, while it is obvious that Uber wants to provide the most convenient, cost-effective service for passengers and maximize their financial gain, they are not motivated to create an equal amount of value for drivers, which seems especially true in shaping how interactions are mediated via their platform. It seems from the outside that Uber may not be sufficiently balancing drivers' stakes in the design of their platform – which is true of similar platforms [Irani and Silberman, 2013, Martin et al., 2014]. In this case, the Stakeholder Theory literature gives us a framework with which to discuss *why* Uber should care about balancing these stakes.

Of course, as in the past with Stakeholder Theory, corporations are not always called to action simply because 'it is the right thing to do.' Freeman argues that corporations should be about collaboratively creating common value as the ends [Freeman, 1994]. One of the motivations for corporations to pay attention to these common values and individual stakes is enunciated in the *consequence argument* [Freeman et al., 2007]. This argument highlights that the interests of stakeholders are often joint (e.g., both Uber and drivers want to provide quality rides to passengers), and that if one stakeholder benefits at the expense of others, then that stakeholder will eventually incur one of several possible consequences. These consequences include leaving the stakeholder network, constraining actions of corporations via political processes, and inventing new methods to satisfy their demands.

I would argue that in the case of Uber, the breach in the various stakes of the drivers is evidence that an imbalance of benefits has occurred, and that furthermore, drivers' assertion of stakes is evidence of consequences to these breaches. That is, when Uber (on purpose or not) takes away the power for drivers to decide which rides to take – which further pushes them into the background of the platform – drivers would assert their position in the market and circumvents the system to continue to make their decisions – the behavior Uber was specifically trying to avoid. When Uber impedes on drivers' ability to earn an adequate wage – either through various policies or new functionality, e.g., UberPool – drivers have been avoiding or abandoning that functionality.

For drivers to stay on the platform, they find ways to create value and assert their stakes, sometimes to the detriment of other stakeholders. I expect that continued breaches to these stakes could bring further, more severe consequences. That is, if drivers' stakes continue to be breached, eventually they may chase the high-quality drivers away and end up with low quality drivers (e.g., resulting from low retention) and dissatisfied passengers. Additionally, if drivers do not feel that their stakes are important to the corporation, they could also assert and protect their stakes in a new network (e.g., changing platform, unionize, etc.). Therefore, Uber might as well be more constructively and proactively balancing the stakes of drivers, or it seems at minimum they will evoke the very types of behaviors they seeks to avoid.

In fact, I see evidence of stakeholders asserting and protecting their stakes in other work and on other platforms. For example, in the case of Uber I can see in this work and in others [Rosenblat et al., 2016, Hanrahan et al., 2017] that drivers are reacting with proactive biases towards groups they suspect will impede on their ability to earn. On Amazon Mechanical Turk, workers react to customers posting low-paying tasks (a breach in the earning stake), by breaching their respective quality stake ('you get what you pay for') [Martin et al., 2014]. On Amazon Mechanical Turk, workers collectively working to assert their stake of fair pay in a number of ways: on forums [Martin et al., 2014]; with tools [Hanrahan et al., 2015, Irani and Silberman, 2013]; or through various campaigns [Salehi et al., 2015]. Therefore, applying Stakeholder Theory to this research trajectory as a means of providing a better way to link user behaviors and appropriations with the platform's functionality and organizational policies.

6.1.2 Design implications of better balancing stakes

Stakeholder Theory provides us with a lens with which we can not only frame existing functionality, but design and justify new functionality specifically to Uber. To illustrate this, I outline two pieces of functionality that were repeatedly discussed by drivers as breaching their stakes: the first being how ratings are given and acted upon; the second being how drivers get assigned rides by Uber.

Whether or not it was intentional, the current design of the rating system is not balancing the stakes of the drivers. While Uber has made improvements to its system, namely the compliments system¹, where passengers can highlight what they especially liked about the ride. However, even with this system a poor rating does not provide any actionable information to drivers, and there is still confusion by the passengers about what the different scores connote (i.e. a 4 is 'unacceptable') [Glöss et al., 2016]. This confusion and opaqueness leads to a host of problems for drivers, and to a lesser extent passengers. Instead of the existing system, I propose to drop the star-based system and define a set of more deliberate, informative ratings for providing feedback. I propose a system that takes a set of similar facets to the compliment system, and uses them as yes/no prompts that asks directly about aspects of the ride. For example: *was the driver on time; was the car clean; did the driver take an efficient route; would you use this driver again*. This might have multiple impacts: 1) it forces Uber to deliberately define the expectations that it sees as the most important; 2) it provides a clear message to the passenger as to what they are actually providing ratings for; 3) it provides actionable feedback for drivers. This slightly more nuanced rating system, could also be linked to drivers' profiles, where they could indicate their type of service (e.g. talkative or quiet, music preferences), which would increase the autonomy of the driver in specifying exactly what type of service their passengers can expect.

¹<https://newsroom.uber.com/compliments/>

Another aspect where drivers discussed their frustration, was how Uber seems to randomly assign rides to them. This also can lead to a negative impact on passengers when drivers sometimes cancel their request. Perhaps, instead of the current system, Uber could give the drivers an increased ability to be more explicit about the types of rides that they prefer. When it was necessary to violate these preferences, Uber would need to give an account as to why the recommendation was issued. Drivers could define the types of rides in terms of whether or not it was ‘worth it’, e.g., pickup location, ride distance, base pay rate, etc. As the current algorithmic management works almost exclusively “one-directional” where drivers having little say for the assignment of rides, providing them with a bit more agency in specifying the types of rides that they would like to make, would enable them to re-negotiate their relationship with the platform [Glöss et al., 2016]. While this may cut some riders out of the service, I would argue that this is already happening, it is just not explicitly captured in the platform. Instead, if drivers were better able to declare their preferences, Uber would be more able to proactively detect when an area was being underserved and respond accordingly.

Paying better attention to how stakes are being balanced/breached, will result not only in more autonomy for the drivers, but likely a better experience on the part of passengers, and may have longer term benefits such as reduced attrition and a pool of more skilled drivers.

6.1.3 Looking forward

Uber structures itself differently from more traditional corporations, which are more reliant on their internal stakeholders and have more investment in their pool of labor. Part of what enables Uber’s structure is the lack of human supervision and the delegation of managerial acts to the platform. A side effect of this setup is that there is very little on-boarding or recruitment costs for Uber, meaning that Uber does not have much of a stake in training and retaining its workers compared to other organizations. This confluence of factors means that Uber can focus on maximizing the experience of passengers to the detriment of its drivers.

At least in the United States, this type of structure, which capitalizes on the independent contractor classification [Felstiner, 2011] is becoming more common for diverse types of work (e.g. Amazon Mechanical Turk, TaskRabbit, etc.). While platforms and the algorithms that enable them are clearly necessary to enable these types of exchanges, it is not clearly necessary for the mediation to be opaque, where stakeholders have limited knowledge, agency, and autonomy over how it mediates their interactions. Instead, these algorithms could increase the autonomy and agency of its users to self-manage, that is, they could increase not just the amount of transparency of these algorithms but to also increase the amount of control users have over them.

I see Stakeholder Theory as a concrete path forward in discussing and improving

on-demand platform-based labor exchanges. As these platforms are becoming more ubiquitous, we need better ways to argue and advocate for the people whose lives are impacted by interacting with these systems.

6.2 Study 2: Ride-hailing Drivers' Experience while Working Part-time

From the participants, I learned that a number of factors impacted the drivers' experience of working on ride-hailing platforms, including their financial situation, other jobs, and the amount of financial risk they are willing to be exposed to or able to avoid. In this study I have referred to this general phenomenon as their financial dependency, and I argue that this is a key aspect to consider when designing and evaluating the efficacy and usability of these platforms. In this section, I reflect on the important aspects of the platform and its drivers that one must consider when designing or investigating these platforms.

6.2.1 Implications for platform design

When building and studying systems and tools for users, there is always some amount of difficulty in drawing a boundary around where the responsibilities of the designers of a system ends and the users begins. For example, are the designers of an email system responsible for information overload, how much responsibility lies in the hands of the email users? While it is certainly hard to draw a clear, distinct line around these responsibilities, I believe that given the amount of control that a platform like Uber and Lyft exercises on behalf of its users, designers of these types of platforms have a level of responsibility to their users that is extraordinary. This means that much more care needs to be taken in evaluating the consequences of functionality for these users, care which I feel is not currently being taken. Part of this responsibility revolves around realizing how workers exercise their agency in response to the various difficulties in using the platform to earn a living. In our experience, this means that more attention is needed when designing for the workers who *need* to make the platform work for them. Given the level of responsibility of the designers in this case, the answer cannot revolve around the system being designed for part-time work, this ignores the long tradition of supporting and respecting user appropriation. If you are designing a system that instantiates a labor market, you have a responsibility to be sensitive to the participants in the market that you own and operate. Therefore, it is not enough to simply determine whether or not a given user can accomplish a task with your system, e.g. arrange a ride, designers need to take a more holistic view of the platform and consider what drivers can do when, for example, they are actively looking for rides. Based on our findings, this means that to properly and faithfully evaluate these gig platforms,

you must take into consideration the varying levels of dependency that your users have on your system. It is not enough to evaluate these platforms for only casual participants in these markets. Properly evaluating usability on these platforms is understanding how someone can use them to make ends meet, focusing on smaller, micro goals is shirking the responsibility one has for instantiating these markets.

For example, it became apparent to us that – at least for the drivers that I spoke with – drivers’ level of dependency on ride-hailing plays an important role in their experience of working on the platform. Drivers who have higher financial dependency on ride-hailing income have different responses to the same situation, and are more likely to drive longer hours and take more drastic action when responding to the uncertainties on the market. These exterior factors can easily be overlooked or perhaps considered ‘non-technical’ issues by designers, but this seems like a mistake to us. The level of financial dependency that a driver has on their ride-hailing income directly impacts how they experience and deal with issues that have been previously reported [Rosenblat and Stark, 2016, Kumar et al., 2018, Hall and Krueger, 2018].

As I further understand the varied contexts under which drivers operate, there are design opportunities around recognizing and supporting the needs of drivers with different levels of dependency. I liken this to a good manager, who would recognize the different ambitions or commitments that their employees have and provide appropriate opportunities.

For instance, for drivers who have a stable full-time job and are only driving as a way to “meet new people” or for extra money, they are more likely to appreciate the flexibility of driving when they choose, and seem to be more amenable to the uncertainty of rides that they are assigned. However, drivers with a higher financial dependency appreciate a more stable set of rides, and they would appreciate being assigned rides that are more optimized for earning and less optimized for new experiences and interest. For example, a more financially dependent driver might prefer to take rides to and from the airport, as such, they would benefit from an assignment algorithm that respected this specialization and might have use for increased functionality around incoming flights. However, the driver that is less financially dependent on ride-hailing, might find taking the same route unpleasant and would not appreciate this functionality.

Take Kathy for example, who had appreciated and enjoyed the “adventure” from an out of the city ride. If drivers had the ability to declare this preference to their algorithmic manager, both parties would benefit. Currently, the dispatching system does not let drivers declare these differences, and utilize surge pricing and various promotion schemes as a more generic strategy to attract drivers to stay on the platform [Chen et al., 2015].

6.2.2 Implication for future studies of gig workers

Future studies of ride-hailing, or gig-workers more generally, must take both their financial dependency and constellation of different gigs into consideration to more fully understand their practices and the amount of risk that they are willing to expose themselves to. It seems that much of how they use the platform depends on these factors, meaning that it is not enough to frame drivers that use Uber as ‘Uber Drivers’, they are often *gig-workers* and should be understood as such. In this case, design has a real and material impact on its users and the precarity of their work.

There is also a temptation to fall into a circular argument around the workers in a gig market being ‘OK’ with working part-time, this completely disregards two important aspects that are uncovered when looking more broadly at their situation: first, working ‘part-time’ in one gig market does *not* mean they are part-time gig workers (this must be taken into consideration in future studies); second, the combination of the level of risk that different workers are willing to accept and that seems inherently part of working on a gig platform, seems to create a quite strong push towards working several gigs to mitigate these risks (e.g. pricing changes or being shutout of a market). In the future, it seems important to understand this inherent push of gig platforms and their markets more broadly, so that we more fully understand how these platforms and their markets are contributing to the fissured workplace, as a way to assess their impact on workers.

6.3 Study 3: Unpacking Sharing in Carpool

In this study, I aimed to understand the nuances of what makes one activity more sharing vs. more of a gig in context of ride-sharing. Based on my investigation into the two carpooling groups, I presented how people interact and form relationship driven by their shared needs and backgrounds. This shared context between participants in the exchange was key to understanding when an activity moves towards ‘sharing’ and the manner in which these rides were enacted differed in key ways from existing practices in ride-hailing platforms like Uber [Lee et al., 2015, Ma and Hanrahan, 2019, Rosenblat et al., 2016].

A primary impact of this key difference, was that it led to more equitable relationships within the exchange when compared to the more transactional nature of ride-hailing relationships. That is, in the case of carpooling the needs were *common* between parties, i.e. they were both heading to roughly the same place at roughly the same time for roughly the same reason. Whereas, in the case of ride-hailing the needs were *complimentary* between parties, i.e. the rider needed to get somewhere and the driver needed to make money and was willing to give them a ride for a fee. In the case of ride-hailing, this created an imbalance in the power relationship as the driver is significantly more invested in the market, in a financial

and abstract sense, and the complimentary needs of each party work against each other at times [Ma et al., 2018], in a way that does not exist in carpooling. In the case of carpooling, the drivers and riders both share the same benefits and risks, in that they both need to get to work on time and riding together makes this more efficient, entertaining, and cheaper. One thing I did not include in this work is a direct comparison of riders' interaction between pool service in ride-hailing versus in carpool, which may further explain how the shared needs and backgrounds may affect their interaction. I hope to explore this in our future investigation.

While prior studies suggest a relationship between having an instrumental motivation with participating in more transactional exchanges and having an altruistic motivation with participating in a more sharing exchange [Bellotti et al., 2015, Bellotti et al., 2013, Bellotti et al., 2014], in the case of carpooling, their shared instrumental motivations actually provides an environment to build and sustain relationships among group members. In another words, I did not necessarily find that the more instrumentally one is motivated for an exchange, the less likely there can be the benefits of sharing and this assumption needs to be investigated more deeply. This means that whatever motivation participants have for participating in the exchange [Bellotti et al., 2015], the ideals of the sharing economy can still be realized without altruistic motivations. It seems that entering into the sharing economy with instrumental needs does not preclude one from experiencing its benefits, in fact, if the instrumental needs are common among participants it may actually help in realizing benefits. That is, one may be prone to assume that a sharing platform ought to be motivated primarily by more altruistic aims, and one that is based on instrumental needs will not lead to as meaningful and strong social ties – for instance, a buyer on eBay would not look to form any relationship with a seller – however, in our case, satisfying these more instrumental needs led to the forming of relationships and friendships. I found that when each participant works to fulfill a common instrumental goal, they can form and sustain a relationship, it may actually be the case that it is in fact easier to form this relationship when participants are working towards fulfilling a shared instrumental goal, the inverse of which can be seen with the difficulties some timebanking communities have in sustaining themselves [Bellotti et al., 2015, Carroll et al., 2016, Chen et al., 2019].

In both carpool groups that I studied, the shared knowledge and experience with a common geolocation among carpoolers served as a unique condition to foster later encounters and relationships, that is at best rarely seen in home sharing communities like Couchsurfing [Klein et al., 2017]. Future work and platforms need to look into how to leverage shared instrumental needs among community members, so that they can form their own rhythms and practices that lead to meaningful social ties and community building.

Between the two carpool groups, the office group formed stronger relationships among its members, primarily because of the regular rhythm of the interaction. On the other hand, the student groups seemed to result more in ephemeral rela-

tionships, and rarely resulted in something that lasted outside of the ride itself. Future work should look into identifying opportunities to design for routine and repeated encounters for community based instrumental or shared activities. For instance, leveraging people’s common background and social activities when arranging carpools. Although something to be mindful is that in some cases, such design in forming group exchanges may result in discrimination of people having same needs, but different backgrounds. I provide further discussion of this opportunity in design implications.

6.3.1 Design implications

This study has design implications for both sharing apps and transactional, gig apps. In below subsections, I outline recommendations to improve platforms that support the sharing economy, while at the same time, I outline recommendations to bring some of the ideals of the sharing economy back to more transactional applications that support the gig economy.

A piece of functionality that all rhythms of exchange will need at some point, is making the initial connections. This was a key use case where our participants would turn to an application for support in finding a new rider or spot in a carpool. In our experience, users are quite willing to put in extra effort to arrange either an exceptional case that is of high value, e.g., getting a ride home from university, or something that could transition into a long-term arrangement. In ride-hailing platforms, the relationships do not span longer than the ride, and riders and drivers are connected through matching algorithms [Lee et al., 2015], this takes away both the burden and the agency of people finding each other. As a result, riders do not need seek help, negotiate or confirm details of the trip, and have less appreciation about the connection or interest in interacting. While this might be the practical reality in most of our daily transportation scenarios, I recommend future work that looks into how much effort riders would be willing to undertake to set up repeat rides from individuals that they have already engaged with, even for example in something like Uber pool.

A key implication that I found, was that the applications that the different carpools were using did not support habitual activities. As a result of the shared needs and backgrounds, each community may share a uniquely common traveling rhythm, e.g., students travelling in beginning/end of the semester, holidays and long weekends; professionals travel daily for commute. Insofar as I could see, this was the key reason for the office commuters’ preference for Waze Carpool over Scoop. They complained that Scoop was “random”, instead, applications need to recognize that there can – and ought to – be more regular rhythms to these exchanges and that these regular rhythms can lead to real benefits and relationships to the participants. At the same time, more exceptional needs could use better support as well, as the probability that someone has that same exceptional need

is quite low in some of the student carpooling cases, this is seen in the difficulty some students had in arranging a ride. In these cases, a system for student carpool community should be designed around the semester, similarly, a system for local senior living community should acknowledge their outing rhythm (e.g., weekends).

One aspect of carpooling that I saw the most social benefit from and for which there was the least amount of support, were the regular/habitual exchanges. Current applications in transactional platforms make connections of users according to their distance [Rosenblat, 2018], skills [Hannák et al., 2017, Kittur et al., 2013] and location [Cheng and Foley, 2018] etc., which fall short in supporting users to set up regular patterns (e.g., arranging a reoccurring ride during the weekdays) and in sharing platforms, did not provide mechanisms to do things like ‘call in sick’ to your carpool. These considerations would help create more stable exchanges, from which I saw carpoolers derive real and consequential benefits. There is a rather large opportunity to provide more tailored functionality for groups that have regular/habitual exchanges. For instance, when matching users for exchanges, algorithm should allocate weight to ‘return matches’ in addition to other existing parameters. Or in a more regular/habitual exchange, perhaps it could be possible to actually schedule a reoccurring exchange in the application. This could create an environment where the two sides of users become more familiar with each other and provide an environment for more respectful relationships to form.

Along these lines, one thing that would help to significantly realize some of the ideals of the sharing economy, is to transition irregular exchange patterns to more regular ones. For instance, if an office commuter is matched with a group, give them functionality to be able to reserve a regular spot, or at the very least, flag themselves as a substitute for that carpool. For the exceptional cases, once an exchange has been completed, give the participants in the exchange a connection beyond that exchange such that it is easier for them to schedule a return ride. Another potential case is that whenever a driver is heading to that location again at a later day, the system could ping the rider and see if they would be interested in that location also, chances are high that their needs will align again, if for example they are headed home during a school break.

While it is likely impossible to have the same level of relationships that are developed in a sharing economy, there are some benefits that may be able to realized on more transactional apps like ride-hailing ones. One is to provide more insight into any common background that the two parties have, for example, it is likely that someone driving for Uber in a college town is also a student and this was a common feature that was often cited in the student carpool. Perhaps, insight into commonalities will create more respectful attitudes from riders towards drivers and vice versa. It is possible that just giving some additional insight into the driver’s background while the rider is waiting could humanize the driver. Whatever the case, putting the driver and rider on more equal social footing at the start of the ride would likely improve the working conditions of the driver. Future work should

look carefully at this, as it may introduce more avenues for biased interactions between participants [Rosenblat et al., 2016, Hanrahan et al., 2017].

6.4 the Overall Lessons from this Dissertation

In this dissertation I have investigated on-demand platforms as a work place focusing on ride-hailing drivers and ride-sharing as a communal activity focusing on carpoolers. As part of this I have focused on three main areas: 1) drivers' stakes of working in ride-hailing, 2) drivers' dependency of working in ride-hailing and 3) how the ideals of sharing is realized in carpool.

Overall, I realized that how platforms make decisions in mediating work affect the workers' experiences and the relationships among different stakeholders on the platform. In the case of ride-sharing, when the design attention focuses on fulfilling platform companies' responsibility to private investors, the barriers and challenges in the platforms become more intense for drivers with higher dependency; drivers and riders in ride-hailing platforms tend to have more superficial relationship, compared to that of the carpool. On the other hand, when the goal of enacting the exchange become mutually instrumental, drivers with varied dependencies on the platform have an equal social footing with riders, they show more respect in interactions with one another and are more likely to form meaningful relationships beyond the shared ride. In the following sections, I present lessons from this dissertation, from which I provide recommendations for future work.

6.4.1 Beyond stakeholder analysis on ride-hailing platforms

As one of the leading ride-hailing companies, this research has focused on Uber's management decisions in discussing the broader conditions of ride-hailing platforms. This discussion cannot be detached from the power dynamic of Uber as a startup company. According to the stakeholder analysis of Uber drivers, the design of ride-hailing platforms have been disproportionately centered around the platform and riders. In this, platform act as a tool to eventually fulfill private investors and shareholders' (hereinafter referred as investors) interests. To their benefit of doubt, Uber could have no choice but to operate with an imbalanced dynamic in order to sustain itself, considering the efforts in raising funds from various investors along the years when Uber pursued its growth [Blystone, 2020]. This is evident in Uber's fast growing record over the past years aiming to achieve profitability after years of losses [Conger, 2020]. As such, referencing Uber Newsroom where the company boasts its number of active drivers and riders and trips completed as part of their achievement [ube, 2020], their goal of growth can roughly be translated to increasing transaction volume and participation. This is reflected in the seemingly mixed intentions in Uber's actions when designing for worker benefits, without simply consider they have no regards to drivers' stakes. Objectively, Uber

has to invest in maintaining relationship with drivers and riders (e.g. reacting to worker grievance, regulations, rider demands etc.) while they ensure fulfillment of their obligation towards investors and shareholders.

This leads to a more nuanced distinction between when Uber acts as a platform owner that ensures smooth operation on the platform, and when Uber acts as a business. This distinction is reflected in how business units of different functionalities within Uber perform to fulfill its function to ensure platform's operation and at the same time, perform in a way that conforms to the business goal of product growth. For instance, *User Experience Research - Driver's team* at Uber is one of the particular business units that presumably provides support for drivers' experience. At the same time, the mission of this team also has to closely align with Uber's product goals in growth. This is also reflected in the culture in which how researchers at Driver's team playing a supportive role in providing insights that recommends product designs, which ultimately conforms to the goals of the product. In this process, one could see some real efforts made to improve drivers' work condition and perhaps result in positive impact, however, this should not be confused with the overall design intention which is centered around fulfilling shareholder's interest. It is worth identifying that these benefits are the by-product of the efforts in fulfilling Uber's responsibility towards shareholders, not a direct intention out of the business goal. This is not to say Uber can never have intention in creating a balanced stakeholder relationship, for now, it is how Uber is funded and sustaining its existence – which contradict with having a balanced stakeholder dynamic. That is, Uber has to keep its current rate of growth in order to fulfill its responsibility to its investors and shareholders or it will be harder for them to survive, having to compete for market share with other players in the ride-hailing (e.g. Lyft) and facing regulations from various markets.

On the other hand, stakeholder theory provides recommendations in an ideally stakeholder balanced organization and how the designs should look like when the organization aims to fairly address all stakeholders' interests. This requires an existing balanced power dynamic within the organization or the willingness for an organization to move towards a balanced power dynamic. The design recommendations based on the stakeholder analysis in Study 1 speak to Uber as a platform should design its functionalities in an ideal ethical way, but did not account Uber's relationship and responsibility to their investors and its inability of changing that dynamic in short term.

Further, Uber's design decisions also resembles the business decisions that are reactionary, in which case the platform relies on both reported drivers' experience and the product's market performance to make design decisions. This means the platform is not motivated to make design decisions based on an ethical principle at the outset, or even worker's grievance alone, but also depends on how worker's grievance in their work condition reflect in the market performance of the product (e.g. until there is an imbalance of supply and demand). On the contrary,

stakeholder theory requires corporations to consider the benefits and risks of all stakeholders as the premise of the design intention, the goal of the platform is the well being and sustainability of all stakeholders. Whereas, in a reactive design, platform is designed disproportionately around a particular stakeholders' interest, because of the interconnected stakes among stakeholders, the platform may have to react to other stakeholders' interests and needs in order to ensure the particular stakeholders' interest. This is not to say it is impossible to change the platform power dynamic from imbalance to balance in the case where a platform is not initially designed with balanced interests of all stakeholders. These change could be achieved if the existing platform is replaced with outside forces (e.g. a new platform with a different set of power dynamic) or political struggles (e.g. worker unionization) to re-organize power within the platform. The contrast between the existing designs in ride-hailing from Study 1 and the recommendations in an ideal platform indicates the gap between a balanced stakeholder design versus a reactive design. Instead, design decisions of socio-technical systems such as ride-hailing platforms should follow a set of moral principles at the outset of its design, instead of coming up with remedies after various outcomes of the design. To overcome an imbalanced design like Uber, ride-hailing should be closely funded with cities and public resources just as other public transportation in order to serve the needs of its broader stakeholders. Particularly, this will allow the design intent of the platform to be publicly decided at the premise, instead of relying on the managers of a privately owned company to make post-hoc mitigation.

6.4.2 Customer Holds Worker Over the Platform Accountable

Similar to the power dynamic in other triangular relationships [Lopez, 2010], the platform largely dominates the experience and relationship between worker and customers. While supporting various exchanges, the platform dictates how work is conducted and actively limits workers to act beyond the platform (e.g. Airbnb prevents off-platform transaction by prohibiting hosts' personal information [Rogers, 2015].) This undermines workers to present an agentic self [Bandura, 1989] while providing a service to customers, and add to the *transactiveness* of the exchange. However, customers' perception on who is accountable for their experience largely overlooks the role of the platform. This is different compared to what we see in traditional service sector. For instance, when a customer received slow service at a restaurant, when they complained to the server's manager, there often is an accountability mechanism, whether it's due to chef's delay, low on staff or the server was on their phone. In either case, the restaurant manager must know how to identify the issue and provide resolution in a conflict like this in order to qualify for their job. On the other hand, when an interaction breaks down between a driver and a passenger in the ride-hailing platforms, the platform is not designed

to identify accountability or resolve conflicts, even worse, the platform hides itself from the conflicts that the driver and the passenger are left on their own. The easiest way out for either party is to point fingers at each other. For example, when a drop off location is at a hospital, the rider expects the driver to drop them off at a certain entrance, but the driver would only drop them off at the main gate which is what the app suggested. This could cause a conflict of expectation due to the accuracy of the app. In some cases, driver and rider's instincts will not be seeking accountability from the app, but instead wondering if the other party should be accountable. It seems that the experience of an exchange will be mostly perceived from the human interaction, instead of the decisions made or influenced by an app. Imagine a similar scenario in traditional service work, when a store clerk having a conflict of expectation in service with customer, a common practice for customer is to speak to a manager. This practice implies the customer belief that the worker does not make decisions of their work practice, instead the store owner/manager is responsible for the action of their treatment.

Based on this, future work should look into customer perception on accountability between human and systems. Similar to Lee's experiment on how people perceive fairness with human versus algorithm [Lee, 2018] decision making, future work should inform how people seek accountability when the outcome of an exchange go well or fall apart. Particularly, when an exchange goes well, do people attribute the good outcome towards the system or the worker; on the other hand, when an exchange falls apart, do people blame the human or the system for the bad outcome?

Given these issues, we have to acknowledge that not all difficult interactions between workers and customers result in extreme outcomes. This is true for low dependency drivers in Study 2 who are more able to avoid negative consequences while interacting with riders. Speaking to the hospital drop off example, a lower dependency driver may be more accommodating in these situation and drop the rider to their preferred entrance, whereas a higher dependency driver may count their minutes and miles of driving into their hourly payment and are not willing to take a loss understanding that these micro-losses could add up.

6.4.3 Stakes in Ride-hailing versus Sharing

While having some common resemblance in how exchanges are carried out, platform market and community sharing are still different and will remain separate in their existence. This is largely due to how different these constructs are motivated, the purpose they serve and the goals of their participants in the respective domains. In a platform supported market where most of the gig work takes place, the goal of the platform is to maximize transactions and sustain such high volume. This means that the platform cannot rely on return/repeated transactions as a way of matching exchanges, instead using much more centralized one-time match-

ing mechanisms. The workers in these platforms are here to make money, while the consumers are here to find a cheap and convenient solution to their needs (e.g., get to places, have food delivered, etc.). They participate in the arrangement of the platform out of clear, but different instrumental motives. The interaction between worker and consumer in the platform setting therefore become a by-product of the exchange, neither party will engage in modifying their way of interacting unless it affects the goal itself. On the other hand, sharing activities does not have the same kind of worker-customer dynamic, or these roles can be much more fluid than in platform supported market. At the same time, participants of these sharing groups often share some kind of common goals, values or backgrounds. Even though their goal of exchange can be instrumental, they are motivated to engage in this activity largely because of these common traits. As many good willed researchers and practitioners trying to construct a system where the platform can adopt the best of both worlds, we need to be aware of these inherent differences in the two domains.

This matters particularly when we try to design for worker-customer relationship. For instance, we should be aware of the barrier when designing nudges for customers to be more caring towards workers through ethical preaching. Over the years, research has recognized reputation systems are essentially supporting mutual surveillance, fear of low rating caused emotional labor [Raval and Dourish, 2016] and eventually lack of trust [Slee, 2017]. It seems reasonable to nudge riders to exercise more caring (behavior such as accommodating, understanding and respecting) towards ride-hailing drivers by leveraging their reputation for work through supporting their self-presentation facing riders. However, there still seems to be a lack of understanding about customers' perspective in engaging with on-demand workers. In fact, such effort can be simply over optimistic in customers' ability and willingness of adopting caring behaviors. Unfortunately, studies have found that consumer behavior are more sophisticated, what they claim in polls may differ from their actual decision making when presented with worker conditions such as sweatshop manufacturing [Devinney et al., 2010]. These uncertainties in consumer decisions also rely on the socio-technical contexts they operate. Particularly, to what extent are they willing to accommodate workers in a difficult situation, what affects their tipping behavior and what motivates them to provide good feedback for workers? In stead of counting on consumers to be good Samaritans, future work should focus on particular socio-technical contexts and understand instrumental factors that motivates consumer behaviors that benefits worker stakes.

In this research, I have gathered insights from ride-hailing drivers and people engage in carpooling activities. Out of various sources and ways in which I collected these insights, drivers in the forum appeared to be the most engaged group of participants in how much they depend on their work to make a living. This resulted in somewhat more negative outlook about working on the platform, although an accurate picture for these drivers. Understanding this potential demo-

graphic bias, in Study 2, I have intentionally selected a mix of urban and suburban ride-hailing markets with varying work conditions, talking to drivers was also helpful in providing a more nuanced picture in explaining why the varying experiences and sentiment among drivers. In Study 3, the findings on the activities and interactions among carpoolers are the most pleasant and lighthearted compared to the previous two studies, mainly because carpooling being a convenient way that people get to places instead of their livelihood. As such, the three studies focused on participants with varying degree of dependence on the ride-sharing activity, and resulted in different experience in their interaction, relationship with one another and their attitudes towards the sharing activity.

The stakeholder analysis is particularly applicable for participants with higher dependency – their livelihood depend on and it is difficult to replace the outcome of exchange that they engage in. As the level of dependency decreased for participant from Study 1 to Study 3, their ability in taking control, behavior and sentiment has changed accordingly. It is fair to imagine for people in other sharing platforms (e.g. exchanging goods), as the outcome of the exchange become more complementary and less essential for participants, their ability to take control, forming relationship and overall experience will also become more likely to realize the promise of sharing.

6.4.4 Future Directions

6.4.4.1 Getting knowledge from gig workers

Over the course of this research I have come to appreciate the workers' knowledge in their day to day practice and through their lived experiences. Particularly, their in-situ experience of the city events can be great value for understanding and designing for urban life. For instance, ride-hailing drivers and couriers' work provide them a sight to the traffic condition of the urban roads. Given that urban congestion have been a difficult problem, having active, real-time reports about traffic density of an urban place can help alleviate congestion and create better transportation experiences for citizens. Future work could leverage gig workers' expertise in city traffic and support citizen decision making in selecting optimal routes. In fact, some form of such activities are already happening among gig workers. For instance, in ride-hailing Facebook groups, drivers post information about constructions on certain highway exits to alert other drivers; during the recent pandemic, couriers inform others about the long wait in certain restaurants. Learning from workers' view can be expanded beyond traffic condition as well. In suburban and rural communities, workers' experience on the road can be shared in the form of pictures and story telling of local events.

In pursuing this research direction, we need to be responsible in considering the additional labor may be introduced to workers, appropriate reward and compensation should be applied when collecting these data. In addition, we need to be

aware that this arrangement can also be easily manipulated into using gig workers to conduct mass surveillance of citizens' lives.

6.4.4.2 Designing for gig work mobility

Many gig workers construct a network of gigs and part-time commitments for themselves, and in most cases, each of these gigs alone cannot provide enough income to a worker. One of the criticisms of gig platforms is the lack of career development opportunity it presents. Even though many gig workers consider their current work as transitional, many of them also admitted that their gigs have been lasting longer than intended, often due to being unable to gain alternative employment. Future work should look into workers' needs in career advancement as we know little about what are some short term and long term goals gig workers have, their current practice and barriers in achieving those goals. From this understanding, we can help identify opportunities for designing workers' career support.

One way to support gig workers' career mobility is to support cross-platform connection between different on-demand workers. For instance, food delivery and graphic designs are very different work that speaks to different skills and pays. How can we design support systems that enable worker mobility where they see a career ladder with a path from a low paying platform to a higher paying platform or a path from temporary to permanent employment? Future work should look into the possibility of connecting workers from different platforms to allow them to exchange labor with career training – i.e., having a graphic designer teach a courier about designing skills and delegating parts of their graphic design work to the courier as training. These research outcomes can also potentially benefit workers developing their career profile. From these recommendations, I hope to provide ways for improving the lives and agency of gig workers.

6.4.5 Closing Remarks

Overall, I believe that this dissertation has brought several unique perspectives to the understanding of the ride-hailing work and the impacts of platform management to gig workers. In addition, I provided an empirical example of carpool activity to support future work in re-designing the gig platforms. Over the course of this research, I felt the barrier of intervening the platforms that I study due to their proprietary nature. My brief internship in one of these platform companies also gave me an inside look about the stakeholder dynamic and how that is affecting platform designs. As such, I believe that to re-claim a fair and equitable workplace for the future of work is to actively invest in designing for worker-centered system interventions from a bottom-up approach. I hope this dissertation provide a solid foundation for those future endeavors.

Appendix **A**

IRB

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EXEMPTION DETERMINATION

Date: August 31, 2017

From: Philip Frum, IRB Analyst

To: Benjamin Hanrahan

Type of Submission:	Initial Study
Title of Study:	Understanding Stakeholder Relations in a Digitally Mediated Workplace
Principal Investigator:	Benjamin Hanrahan
Study ID:	STUDY00007912
Submission ID:	STUDY00007912
Funding:	Not Applicable
Documents Approved:	<ul style="list-style-type: none"> • Driver Interview.docx (1.0), Category: Other • Driver Survey (2.0), Category: Other • HRP-591 Understanding Stakeholder Relations in a DMW.docx..pdf (2.0), Category: IRB Protocol • Participatory Design.docx (1.0), Category: Other • Rider Interview.docx (1.0), Category: Other • Rider Survey (2.0), Category: Other • Screening Questions (1.0), Category: Other

The Office for Research Protections determined that the proposed activity, as described in the above-referenced submission, does not require formal IRB review because the research met the criteria for exempt research according to the policies of this institution and the provisions of applicable federal regulations.

Continuing Progress Reports are **not** required for exempt research. Record of this research determined to be exempt will be maintained for five years from the date of this notification. If your research will continue beyond five years, please contact the Office for Research Protections closer to the determination end date.

Changes to exempt research only need to be submitted to the Office for Research Protections in limited circumstances described in the below-referenced Investigator Manual. If changes are being considered and there are questions about whether IRB review is needed, please contact the Office for Research Protections.

Penn State researchers are required to follow the requirements listed in the Investigator Manual ([HRP-103](#)), which can be found by navigating to the IRB Library within CATS IRB (<http://irb.psu.edu>).

This correspondence should be maintained with your records.

Appendix **B**

Data Collection Instruments

B.1 Survey and Interview Questions for Study 2

Survey questions:

- On average, how many hours per week do you drive for Uber?
- How long have you been driving for Uber?
- What is your net income per week driving Uber in US dollars?
- In your own words, why do you drive for Uber?
- Driving Uber gives drivers freedom of being their own boss. (Lickert scale)
- Uber's rating system performs fairly to both drivers and riders. (Lickert scale)
- I'm positive of having a long term career with Uber. (Lickert scale)
- What can Uber expect from you and what do you expect from Uber?
- Provide an example that Uber should have done more to accommodate drivers.
- Provide an example that Uber has done a great job to accommodate drivers.
- What can a rider expect from you and what do you expect from a rider?
- What is your age?
- What is your gender?
- What is the highest degree you have achieved?

- What is your household income in US dollars? (in buckets and option to opt out)
- In which city/town, province/state, country do you drive?

Interview Questions:

Background:

- How did you start to drive for Uber?
- How long have you driven for Uber?
- Do you like driving for Uber, do you plan to continue?
- Do you use any other driving apps than Uber?

Ride selection:

- What percentage of rides do you accept? Can you give an example of a ride that you rejected?
- How did you make that decision using Uber? What information did you use?
- How do you decide if a ride is ‘worth it’?

Ratings:

- What has your experience generally been with riders? Can you give an example of a good and bad experience?
- Have you received poor ratings? Do you know why? What did you do to try and get better ratings?
- Do you feel that the rating system is a fair evaluation of your work? Can you give an example of a fair/unfair rating?
- Do you feel that you have experienced any biases from riders?

B.2 Interview Questions for Study 3

Motivation and expectation :

- How did you started carpooling?
- What other platforms/means of transportation do you use other than carpool?
- How do you get information/tips about carpool?

- How have you been improving/getting better at carpooling?

Understanding how the carpool was carried out:

- What is the most difficulty part about carpool?
- what do you enjoy the most about carpool?
- Can you walk me through the whole process, from the point where you posted a request to you arrived at your destination?
- Tell me a bad situation that you experienced while carpooling, how did you deal with it?
- Tell me a good situation that you experienced while carpooling?
- What were the interaction like during a carpool trip?
- How do you usually interact with the driver/other riders?
- What is one thing you think can be improved in the carpool experience?

Understand sense of community:

- Given opportunity, would you share a ride with the same person again next time/have you ever done so? Why?
- Have you ever had an after-trip experience with someone you carpooled with?
- Comparing your experience when taking an Uber/Lyft ride, what is similar or different?

The above interviews are semi-structured, follow up questions are asked depending on participants' answers which are not included here.

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